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SOIL CAPABILITY FOR IRRIGATION WITHIN THE STURGEON BASIN STUDY AREA

H. F. REGIER
EDMONTON, ALBERTA
1971

WATER RESOURCES
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SOIL CAPABILITY FOR IRRIGATION
WITHIN THE
STURGEON BASIN STUDY AREA

Prepared By

H.F. Regier
July, 1971

Submitted By:

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ABSTRACT

The soils of the Sturgeon Basin Study Area were rated for their irrigation capability. This capability rating excludes topographic ratings.

The soil capability ratings were based upon soil profile development, type of geologic material and uniformity, texture, hydraulic conductivity, and the chemical parameters S.A.R. and E.C. The soil map units used were those determined by Alberta Soil Survey at the detailed reconnaissance and reconnaissance level of soil mapping intensity. Data collected for the assessment of a particular soil series for its irrigation capability was applied to that soil series throughout the study area.

The study area consists of 579,370 acres of which 103,120 acres are fair irrigation soils (Category 2), 221,740 acres are marginal irrigation soils (Category 3), and 254,510 acres are nonirrigable areas including 20,100 acres which consist of organic soils, wet areas, and open water. None of the soils were classed as good irrigation soils (Category 1).

ACKNOWLEDGEMENT

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INTRODUCTION

In order to plan for the development of an area such as the Sturgeon River Basin it is essential that planning be approached from an interdisciplinary level. It is within such framework that this report, which deals with the classification of soils for irrigation capability within the Sturgeon Basin Study Area, becomes an input study to be coordinated with other studies so as to derive a unified plan for development.

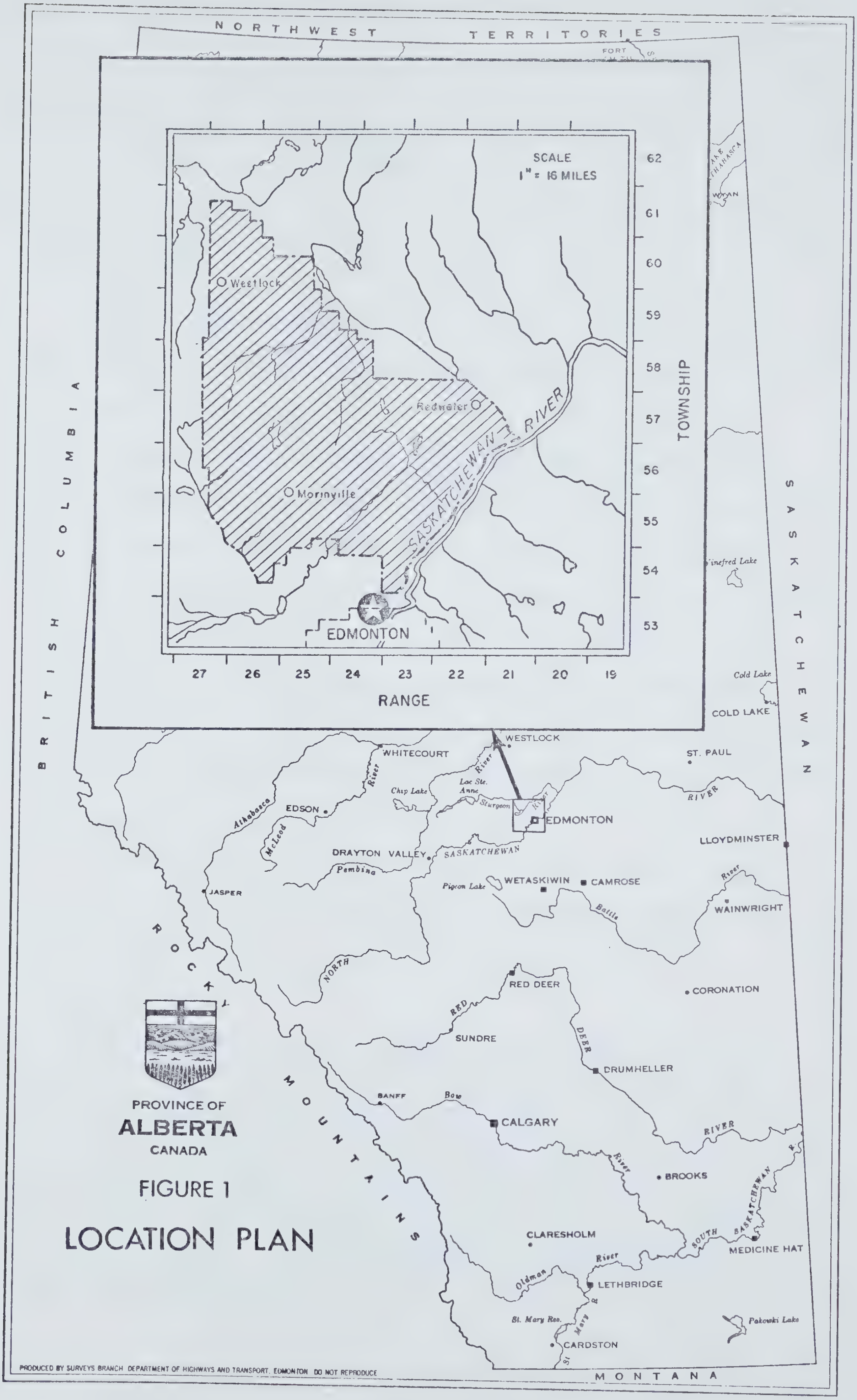
The Sturgeon Basin Study Area lies north of Edmonton in the northern Alberta Plains within the elevations of 2,000 to 2,500 feet. The irregular boundary of the study area lies within an area whose extremities are roughly bounded by longitudes 113° 02' and 113° 55' west, and latitudes 53° 39' and 54° 18' north. The area covers 900 square miles and is largely situated within the Municipal District of Sturgeon with lesser areas, respectively, within the Municipal District of Westlock, and Thorhild County.

Climate is continental; warm summers and cold winters. The frost-free period within the area is approximately 100 days, however, variations from this mean can be extreme. The mean summer temperature May to September, inclusive, is approximately 55°F. Most of the area receives at least 2,100 degree days annually. Precipitation can be variable, however, the annual mean is considered to be approximately 17.5 inches with approximately 9 inches of that amount falling during the months of June, July and August. A soil moisture deficit usually develops during the growing season.

Vegetative associations within the area are generally characterized by parkland and continuous forest.

The soils investigation of the Sturgeon Basin consisted of three major phases: (1), compilation and preliminary evaluation of existing information; (2), collection of information specifically for the irrigability classification of soils; and (3), analysis and evaluation of the results.

The map units used to delineate areas of soils differing in irrigation capabilities are those determined by Alberta Soil Survey. These units are mapped at the reconnaissance and detailed reconnaissance level of soil mapping intensity and are intended to show at least the general distribution of soils. Soil categories for irrigation are based upon permanent and nonpermanent soil characteristics, excluding topography.



PROVINCE OF
ALBERTA
CANADA

FIGURE 1

LOCATION PLAN

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GEOLOGY

Bedrock Geology

The Sturgeon Basin Study Area lies within the plains region-a relatively flat area underlain by gently dipping strata of Paleozoic, Cretaceous, and Tertiary ages.

Of concern here will be those rocks of Upper Cretaceous age which directly underlie geologic materials deposited during glaciation. As indicated in Figure 2, the study area is underlain by the Belly River Group, the Bearpaw Formation, and the Edmonton Formation. Just within the boundary of the study area the Bearpaw Formation pinches out. Since the Bearpaw Formation separates the Belly River Group from the Edmonton Formation, without the separating Bearpaw Formation the Belly River Group and the Edmonton Formation become undifferentaited, and hence, are referred to as the Wapiti Group.

Following is a description of the lithologic characteristics (Alberta Soc. Petol. Geol., 1960) of the aforenamed geologic groups and formations:

Belly River Group

The Belly River group is composed in descedning order of the Oldman formation and the Foremost formation. The upper member of the Oldman formation consists of carbonaceous sandstone and shaly coal seams with one or more bentonite beds near its top. The lower member is composed of light grey sandstones and shales with minor amounts of greenish, brown, and reddish shales with plant fragments and thin beds of siltstones. The Foremost formation has at its top coal seams and carbonaceous shales, these are underlain by sandstones, shales, Ostrea and Corbula beds with a few beds of carbonaceous shale. In some localities a thin coal zone occurs near the bottom of the formation which is underlain by the basal Verdigris sandstone member.

Bearpaw Formation

Predominantly dark grey or brownish grey shale that tends to weather into small angular fragments or flakes. Ironstone concretions and thin bentonite beds are common.

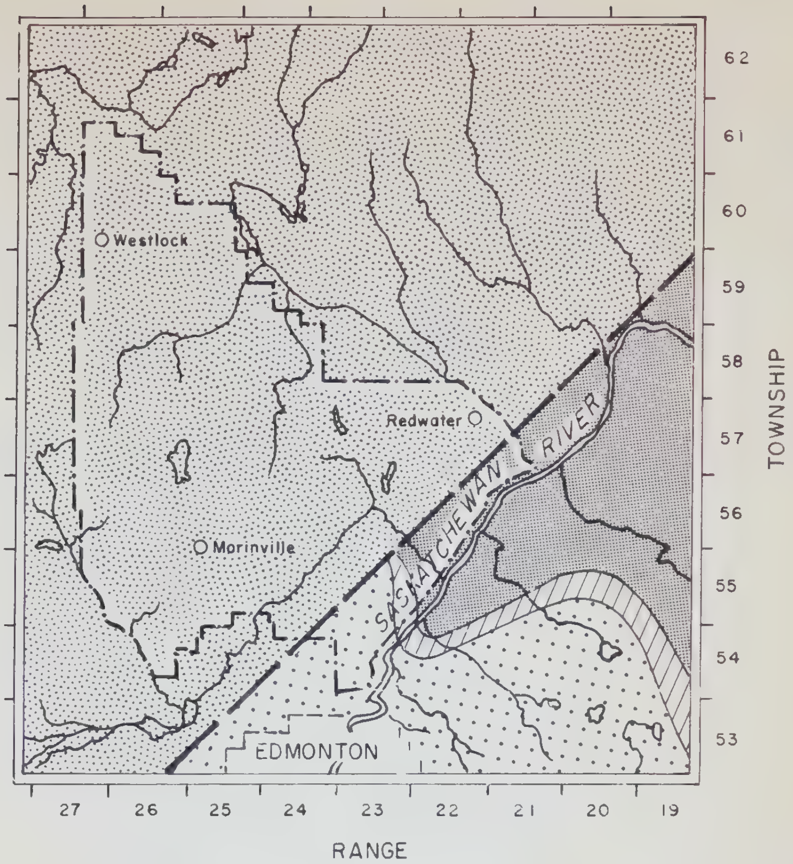
Edmonton Formation

Vertical and lateral lithologic variations are notable in the Edmonton formation. It consists predominantly of fresh to brackish water, fine-grained sandstone, calcareous sandstones, sandy shales, bentonitic sandstones and shales, bentonite, ironstone nodules and bands, carbonaceous shales, and coal. Bentonite is conspicuous throughout the series of beds, with shales and sandstones containing appreciable quantities. Pure bentonitic beds are locally present. Hard, flaggy sandstones occur in well-defined horizons. The Edmonton formation is remarkably free of coarse clastic material.

Wapiti Group

The Wapiti group consists of non-marine massive sandstone, bentonite, pebble conglomerate, grey shales, sandy shales, and thin coals.

SCALE: 1" = 16 MILES



BEDROCK GEOLOGY
Of The
STURGEON RIVER AREA

— LEGEND —

STURGEON BASIN STUDY AREA BOUNDARY — · — · — · —

INFERRED GEOLOGICAL BOUNDARY — — —

DEFINED GEOLOGICAL BOUNDARY ⁓

— GEOLOGY —

MESOZOIC	EDMONTON FORMATION: Sandstone, Shale, and Coal	⁙
	WAPITI FORMATION: Non-Marine, Sandstone, Shale, and Coal	░
	BEARPAW FORMATION: Marine, Shale, and Minor Sandstone	▨
	BELLY RIVER FORMATION: Sandstone, Marine and Non-Marine Shale, and Coal	▓

FROM RESEARCH COUNCIL OF ALBERTA, 1968

FIGURE 2

GLACIAL GEOLOGY

During Pleistocene time Alberta was overrun by two ice sheets: one, the Keewatin - centered continental ice sheet which covered most of Alberta and advanced generally from the north-northeast; and two, the Cordilleran ice sheet which advanced eastwards from the Rocky Mountains.

Field studies conducted by Bayrock and Hughes (1962, p.28) have indicated that the last ice advance over the Edmonton area was from a northeasterly direction. This then indicates that the glacial material found within the study area is of Continental composition which has a low carbonate content and consists mainly of sand and clay-size materials (Pawluk and Bayrock, 1969, p.4). Also, since the bulk of the glacial material is locally derived, its composition largely reflects that of underlying or nearby strata. As previously mentioned, the study area is underlain by Cretaceous rocks which in the Alberta Plains are characterized by the presence of abundant montimorillonite in both sandy and shaly units and a high proportion of unstable igneous detritus (ibid., 1969, p.3).

Although glacial material has characteristics inherited from parent material, Pawluk and Bayrock (ibid., 1969, p. 18) note that it is evident that areas of high salt concentrations do not coincide with specific bedrock formations and salt content of till (whose properties would reflect characteristics of other glacial material). High salt concentration in the till is related to groundwater discharge and does not reflect the original composition of till but is a characteristic acquired by the sediment after deposition. This is especially true

for soils of the Solonetz and Solod Great Soil Groups. Hence, although much of the glacial material within the study area has been derived from rock strata of low salt content, there are areas of high salt concentrations within the soil profiles. Much of the area's glacial material is, however, low in soluble salt content, especially in those areas in which the soils fall into the Chernozemic Order.

Glacial material within the study area has been grouped into seven types (Bowser, et al., 1962 and Bayrock and Hughes, 1962). These types include aeolian, aeolian and alluvial, alluvial and lacustrine, lacustrine, pitted deltaic, outwash and glacial till.

In this report glacial material referred to as aeolian is used to describe sand dunes which were produced in areas where loose sand was available. The major area covered by sand dunes is southwest of Redwater, and runs in a northwest-to-southeast-running band. Aeolian material covers 21,800 acres.

Deposits described as aeolian and alluvial are those materials deposited by combined aeolian and alluvial means (Bowser, et al., 1962, p.65). Such deposits consist largely of sand with lesser amounts of silt and clay, and often occur in association with aeolian material. In the study area 58,000 acres of aeolian and alluvial material occurs.

Glacial deposits described as alluvial and lacustrine are medium textured materials having characteristics of both alluvial and lacustrine deposits (ibid., 1962, p.65). The major portion of the areas mapped as alluvial and lacustrine lies in the cental portion of the northern part of the study area. Lesser amounts occur especially in the eastern half of the study area. An area of 83,900 acres has been map-

ped as having deposits characteristic of both alluvial and lacustrine deposits.

Lacustrine deposits as described by Alberta Soil Survey (Bowser, et al., 1962, p.65) are those deposits which are fine textured, stone free, and uniform. Such deposits could be classed as "normal deposits" as outlined by Bayrock and Hughes (1962, p.20). Normal deposits consist of bedded fine sands, silts and clays and are the most common lake sediment. Most of the lacustrine deposits are those of Lake Edmonton and occur in the southern half of the study area. Lacustrine deposits were mapped in 136,700 acres.

Pitted deltaic material is composed of crossbedded fine sands and silts. Thin clay and clayey beds may be encountered. Due to post-depositional changes of altitude much of the bedding is severely contorted. An area of 25,800 acres of pitted deltaic material was mapped in the eastern half of the study area.

Outwash deposits of sand and gravel are of minor occurrence in the study area.

Glacial till, an unsorted and unstratified sediment deposited directly by a glacier, occurs throughout the study area, especially in the western half. Also, till underlies most of the other glacial deposits. Bayrock and Hughes (1962, p. 18) define the average mechanical composition of till in the Edmonton areas as being composed of 41.1 per cent sand, 31.4 per cent silt and 27.5 per cent clay. The clay-size fraction of the till contains a large percentage of montmorillonite. Till was mapped in 186,100 acres.

The distribution of glacial deposits within the study area is presented in Figure 3. The information presented was inferred from Alberta Soil Survey maps and reports. Boundaries delineating types

of glacial deposits are in some cases general in that they outline a dominant glacial deposit rather than a single deposit. For example, if till and alluvial lacustrine material occur in close assocation within a given area, that area will be outlined as till if till is the major glacial deposit.

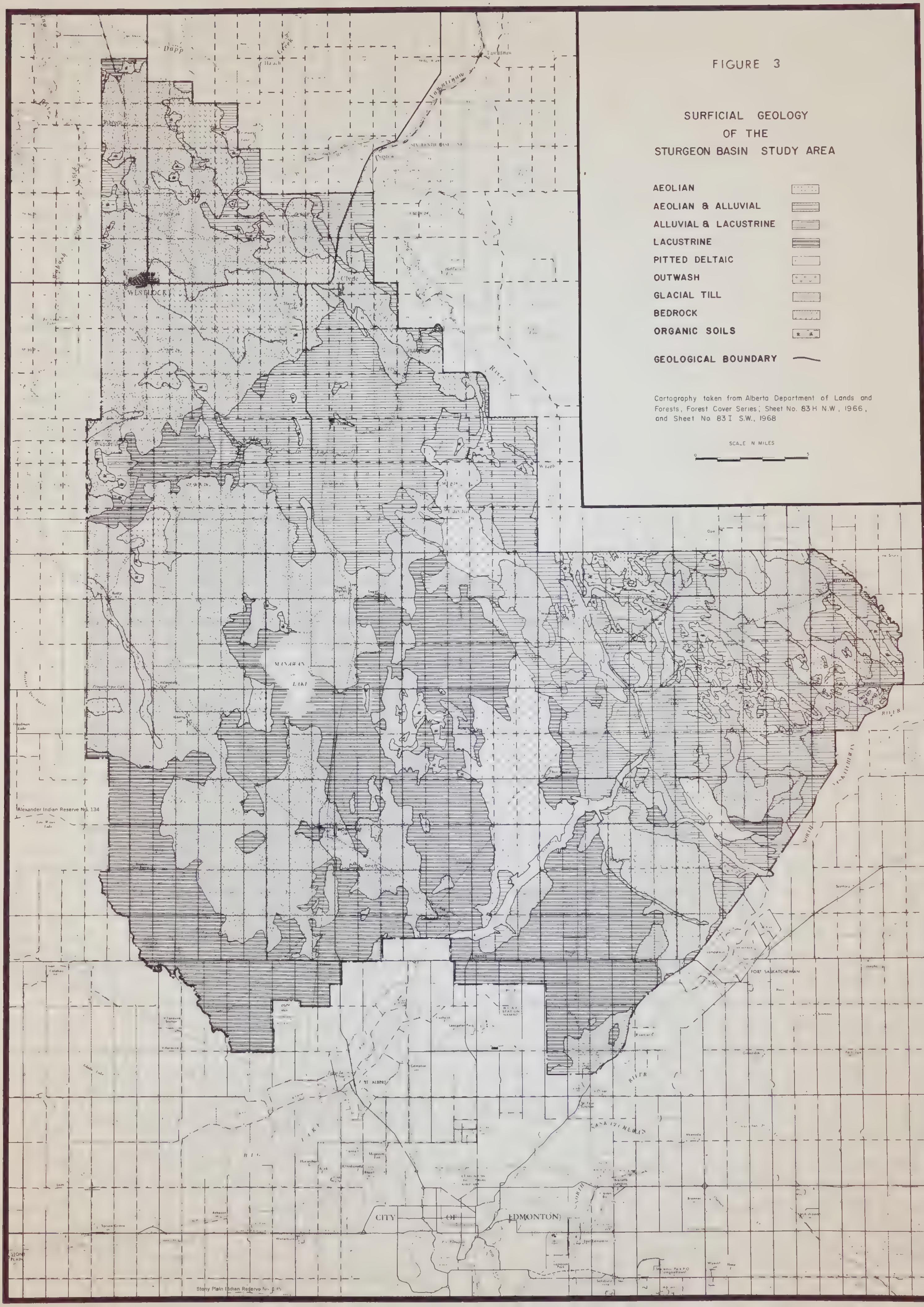


FIGURE 3

SURFICIAL GEOLOGY OF THE STURGEON BASIN STUDY AREA

Cartography taken from Alberta Department of Lands and Forests, Forest Cover Series, Sheet No. 83 H N.W., 1966, and Sheet No. 83 I S.W., 1968

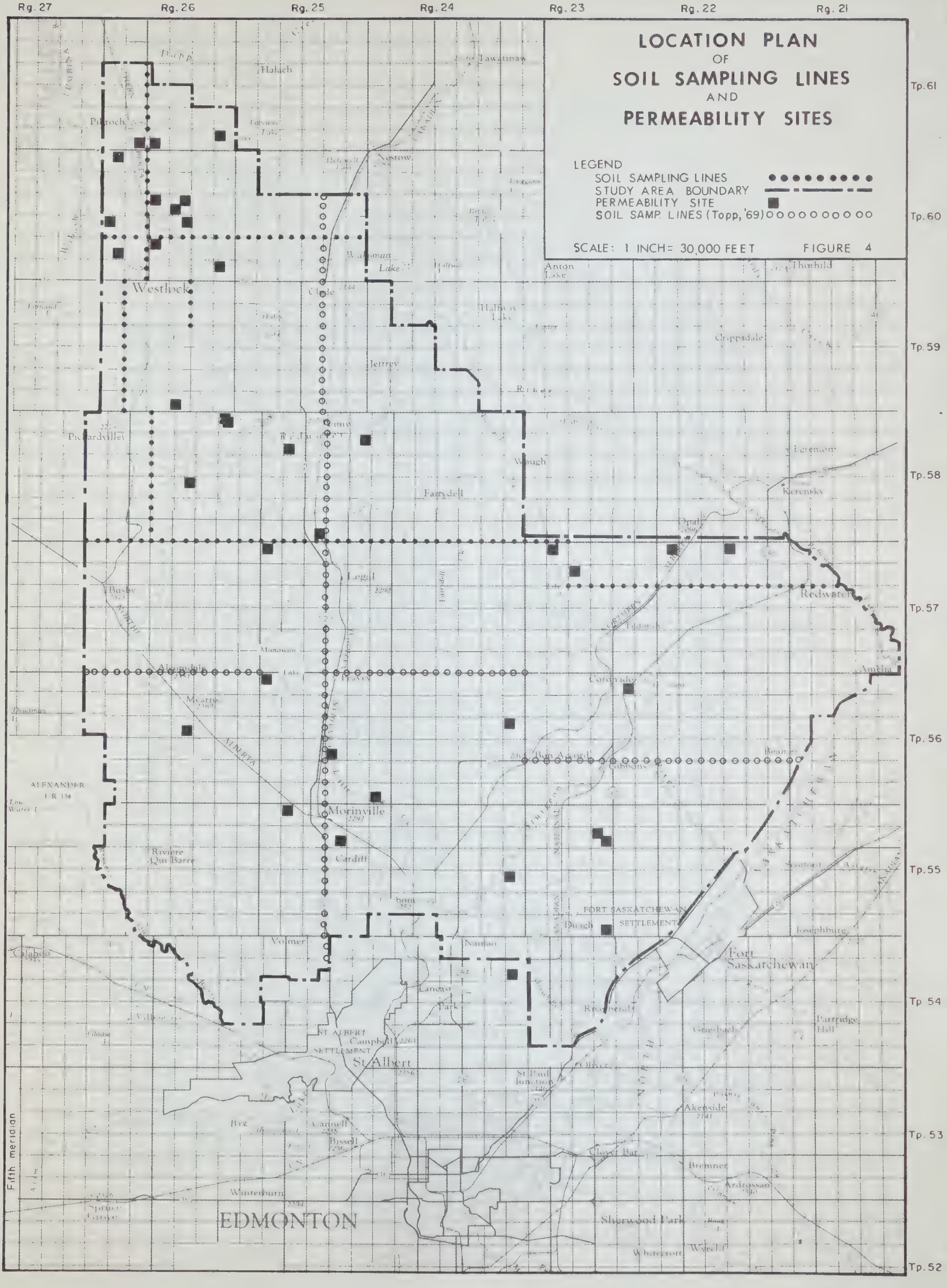
SCOPE AND SAMPLING PROCEDURES

Soil sampling was conducted with the intent of collecting data at the detailed reconnaissance level of soil mapping intensity. Data collected was applied to that soil series throughout the study area.

Using soil series boundaries as established by Alberta Soil Survey, arbitrary lines of soil sampling were chosen for the purpose of sampling most of the soil series represented within the study basin. Sampling sites were arbitrarily fixed at intervals of approximately one tenth of one mile along sampling lines. Using a FA-100 wet auger drill, sites were cored to a depth of 10 feet and drilled at one mile intervals to the bedrock contact or to a depth of 40 feet. The soil profile and underlying geologic material was described. Soil samples were taken from the combined A and B soil horizons, the start of the C horizon, at a depth of 5 to 6 feet if this depth was well into the C horizon, and at a depth of 9 to 10 feet. In test holes deeper than 10 feet, samples were usually taken at depth intervals of 10 feet. Approximately 700 sites were sampled.

Additional soil information was drawn from approximately 230 soil sampling sites previously sampled for an irrigation capability study of the soils within the Sturgeon Basin Study Area (Topp, L.C.).

A location plan of soil sampling lines and permeability sites is given in Figure 4.



LOCATION PLAN
OF
SOIL SAMPLING LINES
AND
PERMEABILITY SITES

LEGEND
SOIL SAMPLING LINES ●●●●●●●●●
STUDY AREA BOUNDARY —·—·—
PERMEABILITY SITE ■
SOIL SAMP. LINES (Topp, '69) ○○○○○○○○○

SCALE: 1 INCH = 30,000 FEET

FIGURE 4

ANALYSIS AND DATA EVALUATION

Chemical Analyses

The pH of soil samples was determined by the saturated soil paste method. Soluble salt content was determined by resistivity measurements on saturated soil paste extracts. Chemical determinations of calcium plus magnesium, sodium, sulfates and chlorides were performed on saturations extracts (U.S.D.A. Salinity Handbook No. 60, 1954).

Physical Analyses

The soil permeability of some of the major soil series within the study area was determined using the well permeameter method (U.S. Dept. of Interior, 1968).

For those soil series for which permeability rates were not determined, rates were inferred from data available from genetically related soils.

Data Evaluation

Basic soil ratings for irrigation were applied as outlined within "Alberta Standards for Irrigated Land Classification," (Alberta Dept. of Agriculture, 1968). In instances where basic soil ratings were not available, ratings were determined as outlined within the "Handbook for the Classification of Irrigated Land in the Prairie Provinces," (Canada Dept. of Agriculture, 1964). The basic soil rating is a weighting of the permanent characteristics which include

the characteristics of the soil profile, the geological material, and texture. The parameters E.C. (Electrical Conductivity in millimhos/centimeter at 25°C of extract from water saturated soil), S.A.R. (Sodium-Adsorption-Ratio; where

$$\text{S.A.R.} = \frac{\text{Na}^{+}}{\sqrt{\text{Ca}^{++} + \text{Mg}^{++} /2}} \quad), \text{ and}$$

H.C. (Hydraulic Conductivity in inches/hour) were factors which could further affect a soils irrigation capability rating (Alberta Dept. of Agriculture, 1968).

DISCUSSION OF RESULTS

The soils of the Sturgeon Basin Study Area fall into two divisions: irrigable and nonirrigable. The irrigable division contains 324,860 acres of the total area of 579,370 acres whereas the nonirrigable area contains 254,510 acres. Figure 4 illustrates the distribution of irrigable and nonirrigable soils within the study area.

The soils of the irrigable division have been categorized into 3 categories: good irrigable soils (Category 1), fair irrigable soils (Category 2), and maringal irrigable soils (Category 3). The limitations for each of these categories are outlined in Appendix C.

None of the soils within the study area were classed as good irrigation soils.

An area of 103,120 acres was classed as fair irrigation soils. These soils have developed on those areas mapped as alluvial lacustrine and pitted deltaic and fall into the Black and Dark Gray Great Soil Groups. The restrictions of these soils are primarly hydraulic conductivity and those restrictions as imposed by the soil's permanent characteristics.

An area of 221,740 acres was classed as marginal irrigation soils. These soils have generally developed on glacial till, lacustrine deposits, and alluvial aeolian deposits. The soils of this category are representative of the Chernozemic, Luvisolic, and Gleysolic Soil Orders. Permanent soil characteristics are again restrictive to irrigation as are low permeability rates and, in some instances, chemical restrictions.

Approximately 40 per cent of the study area, or 254,510 acres, were classed as nonirrigable. Of this total 20,100 acres consist of open bodies of water, wet areas, and organic soils. The remainder of the nonirrigable portion of the study area consists of soils developed on weathered bedrock, sand dunes, and in part on glacial till and lacustrine deposits. With the exclusion of sand dune soils, organic soils, and lakes, this category consists largely of soils of the Solonetz and Solod Great Soil Groups. Soils of this category have severe permanent-soil-characteristics restrictions, chemical restrictions, and very restrictive permeability rates.

All of the soils within the study area have textural, geologic, or profile restrictions. Most of the irrigable soils do not have chemical restrictions. However, either low or excessive peremability rates are considered restrictive in all of the soils studied. The distribution of irrigable and nonirrigable soils is shown in Figure 5.

An outline of the data used to determine the irrigation capability of the soils within the Sturgeon Basin Study Area is presented in the Appendix. Appendix A consists of a summary of general geologic, textural, and chemical data which refers to most of the soil series within the study area. Appendix B presents the permeability rates for various depths of the soils whose permeability rates were determined. Appendix C outlines the requirements for good, fair, marginal, and nonirrigable soils. Appendix D summarizes data in a series of soil-irrigation-capability maps.

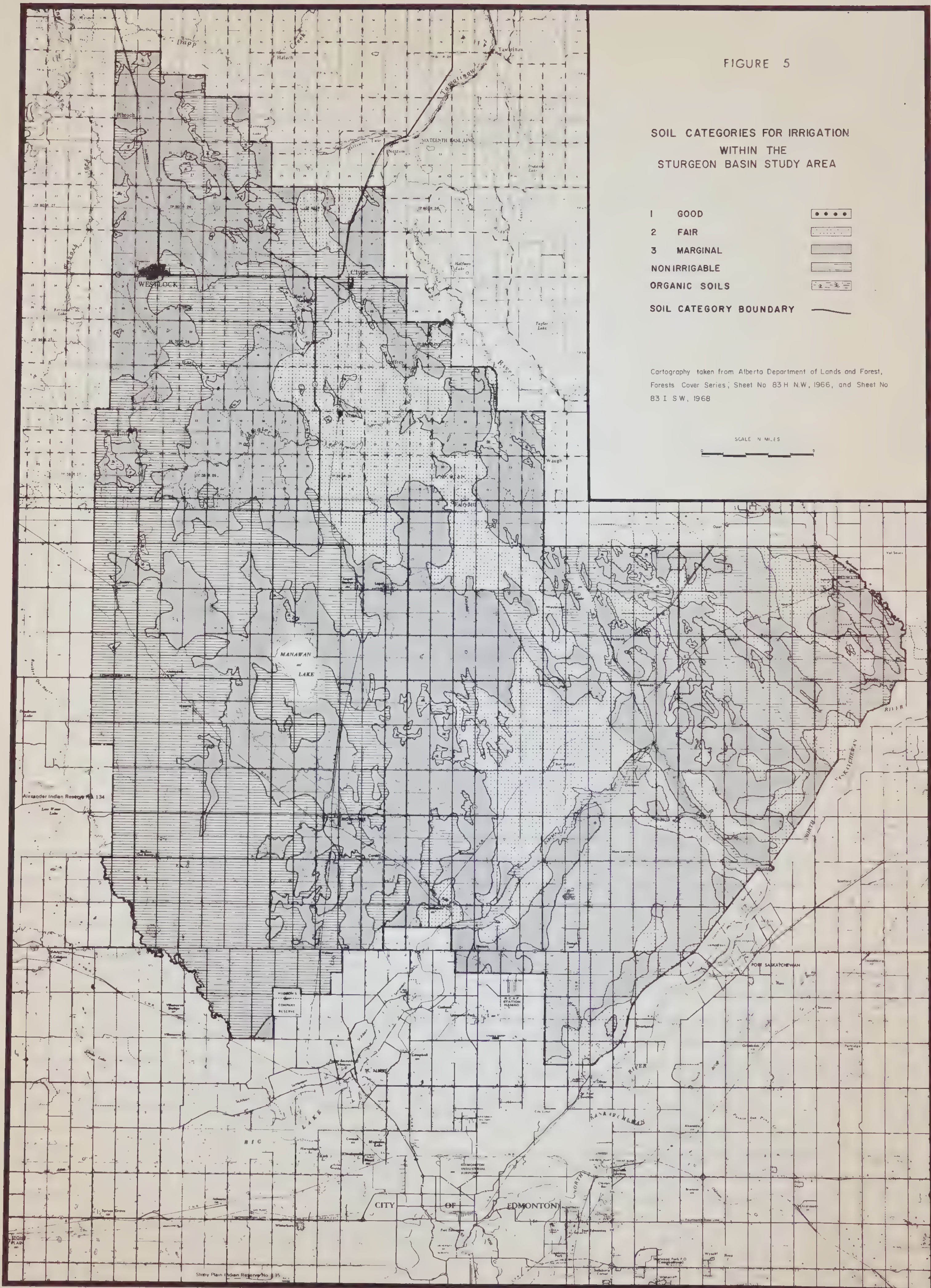


FIGURE 5

SOIL CATEGORIES FOR IRRIGATION
WITHIN THE
STURGEON BASIN STUDY AREA

Cartography taken from Alberta Department of Lands and Forest, Forests Cover Series, Sheet No 83 H N.W, 1966, and Sheet No 83 I S W, 1968

NOTE ON GROUNDWATER

Mapping of field phenomena produced by groundwater may be helpful in obtaining a preliminary idea of the possible consequences of irrigation (Toth, 1966). The Research Council of Alberta has mapped areas of downward groundwater flow and upward groundwater flow in part of the area which comprises the Sturgeon Basin Study Area (Borneuf, 1971). Also, during the time soil samples were collected for irrigation capability assessment, 72 water table observation wells were installed at 1-mile intervals.

Although the data provided by these observation wells is thus far scant, in December, 1970 (the only winter data available, thus far) the water table was observed to be less than 10 feet below ground surface for 49 of 70 observation wells monitored. Many of the shallower water tables were observed to be in the Westlock area.

Whether the water tables which are near ground surface indicate slow groundwater recharge rather than discharge is not known. Leskiw (1971) found that in the Vegreville area, soil of such Soil Subgroups as Eluviated Black, Gleyed Eluviated Black and Humic Gleysol occurred in groundwater recharge areas and that soils of the Soil Subgroups such as Black Solonetz and Carbonated Saline Gleysol occurred in groundwater discharge areas. In the Westlock area shallow water tables were found in soils such as the Gray and Black Solonetz Soil Subgroups as well as in such soils as in the Orthic Humic Gleysol and Gleyed Black Soil Subgroups.

CONCLUSION

Approximately 60 per cent of the soils within the Sturgeon Basin Study Area were classed as irrigable. Of this portion no soils were classed as good irrigation soils. Approximately one-third of the irrigable soils are fair irrigation soils, whereas the remaining two-thirds are marginal.

Some of the soils classed as fair irrigation soils (Category 2) have developed on pitted deltaic material. This material often contains discontinuous strata of sand and gravel (beds are usually less than 1 inch thick although beds to 6 inches in thickness have been reported), hence, internal drainage may be affected. Also, those fair irrigation soils developed on alluvial lacustrine material often have sand and fine gravel separating the overlying material from the underlying glacial till. Again, this situation could impose an internal drainage problem.

Soils classed as marginal irrigation soils are largely limited by poor internal drainage. If irrigated, these soils may have a high internal drainage requirement.

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APPENDIX A

GEOLOGIC, TEXTURAL AND CHEMICAL SUMMARY

This Appendix follows the Soil Subgroup sequence as outined in "The System of Soil Classification for Canada", (Canada Dept. of Agriculture, 1970).

SOIL SUBGROUP: Orthic Black

SOIL SERIES: Ferintosh

Depth, in feet	Dominant Geologic Material and Texture	No. Samples	S.A.R. Mean	No. Samples	E.C. Mean	No. Samples
0 - 4	Outwash; SL, L, S & Gr.	2	7.0	2	2.6	2
4 - 10	Outwash & till/bedrock; SCL, S & gr.	2	3.2	2	1.2	2
				Ferintosh/Bedrock		
0 - 4	Outwash; SL, CL, S & Gr.	2	3.1	2	4.2	2
4 - 10	Bedrock	2	3.8	2	5.3	2
				Peace Hills		
0 - 4	Aeolian & alluvial; SL, LS, S	22	1.3	22	0.6	22
4 - 10	Aeolian & alluvial/till & bedrock; LS,/SCL, SC	22	1.9	21	0.5	21
10 - 20	Some aeolian alluvial/bedrock & till; SC	5	6.2	2	1.0	2
				Ukalta		
0 - 4	Alluvial aeolian; SL, CL	1	1.9	1	0.7	1
4 - 10	Till; CL	1	1.3	1	0.5	1
10 - 20	Till; CL	1	2.3	1	1.4	1
20 - 30	Till; CL	1	2.8	1	1.2	1
30 - 40	Till; CL	1	3.3	1	1.0	1

SOIL SUBGROUP: Eluviated Black SOIL SERIES: Angus Ridge

Depth, in feet	Dominant Geologic Material and Texture	No. Samples	S.A.R., Mean	No. Samples	E.C. Mean	No. Samples
0 - 4	Till; CL	66	2.4	66	1.0	66
4 - 10	Till; CL	66	1.8	66	0.8	66
10 - 20	Till; CL	12	2.5	9	2.1	9
20 - 30	Till; SC	6	3.0	7	2.5	7
30 - 40	Till; SC, C	6	4.1	6	2.0	6

Hobbema

Depth, in feet	Dominant Geologic Material and Texture	No. Samples	S.A.R., Mean	No. Samples	E.C. Mean	No. Samples
0 - 4	Alluvial lacustrine/till; L, SiL, CL/CL	10	1.8	10	0.7	10
4 - 10	Till; CL	10	2.7	10	0.4	10

Malmo

Depth, in feet	Dominant Geologic Material and Texture	No. Samples	S.A.R., Mean	No. Samples	E.C. Mean	No. Samples
0 - 4	Lacustrine; SiCL, C	12	0.7	12	1.9	12
4 - 10	Till, some lacustine; SC, CL	12	1.1	12	1.0	12
10 - 20	Till & lacustrine; SC, SiC	1	1.2	1	1.6	1
20 - 30	Till; C	1	3.2	1	2.1	1
30 - 40	Till & bedrock; C	1	7.8	1	2.0	1

Ponoka

Depth, in feet	Dominant Geologic Material and Texture	No. Samples	S.A.R., Mean	No. Samples	E.C. Mean	No. Samples
0 - 4	Alluvial lacustrine; CL	70	1.2	73	1.1	73
4 - 10	Alluvial lacustrine/till; SiL, CL, SC	70	1.4	70	0.9	70
10 - 20	Till; SC, CL	11	2.2	6	1.5	6
20 - 30	Till; SC, CL	5	3.9	3	1.6	3
30 - 40	Till; SC, SiC	4	6.1	3	1.6	3

SOIL SUBGROUP: Eluviated Black (Cont.) SOIL SERIES: Ponoka/Bedrock

Depth, in feet	Dominant Geologic Material and Texture	No. Samples	S.A.R. Mean	No. Samples	E.C. Mean	No. Samples
0 - 4	Alluvial lacustrine; SCL	2	5.3	2	5.0	2
4 - 10	Bedrock	2	5.9	2	1.5	2
10 - 20	Bedrock	1	9.0	1	2.8	1
	Gleyed Black			Jeffrey		
0 - 4	Alluvial lacustrine; L, SiL, SCL	7	1.5	7	0.9	7
4 - 10	Till; CL	7	1.4	7	1.1	7
10 - 20	Till; CL	2				
20 - 30	Till and bedrock; SC	2				
30 - 40	Till and bedrock; SC					
				Peace Hills Meadow		
0 - 4	alluvial aeolian; LS, Gr., SL, CL	10	2.2	10	1.3	10
4 - 10	Alluvial aeolian/till; LS, Gr./CL, C, SC	10	1.9	9	0.9	9
				Pibroch		
0 - 4	Till; CL, SCL, L	60	1.2	60	1.0	60
4 - 10	Till; CL	60	1.6	60	0.8	60
10 - 20	Till; CL, SC	6	3.2	5	2.3	5
20 - 30	Till; CL, SC	5	6.2	4	2.7	4
30 - 40	Bedrock and till; SC, CL	5	9.8	4	1.8	4

SOIL SUBGROUP: Orthic Dark Grey SOIL SERIES: Falun

Depth, in feet	Dominant Geologic Material and Texture	No. Samples	S.A.R., Mean	No. Samples	E.C. Mean	No. Samples
0 - 4	Till; CL	75	1.4	75	0.8	75
4 - 10	Till; CL, SC	75	1.7	75	0.6	75
10 - 20	Till, some bedrock; CL, SC	9	2.6	5	1.2	5
20 - 30	Till, some bedrock; CL, SC	5	4.3	5	2.2	5
30 - 40	Till, some bedrock; CL, SC	5	4.2	5	1.5	4
				Mico		
0 - 4	Lacustrine; CL, C, SiCL	20	0.8	20	1.2	20
4 - 10	Lacustrine & Till; SC, C	20	0.9	20	0.6	20
				Redwater		
0 - 4	Alluvial aeolian; LS, SL, L, S & Gr., SCL	7	0.6	7	0.7	7
4 - 10	Some alluvial aeolian/till; CL, LS	7	0.5	7	0.5	7
10 - 20	Till; CL	1	0.9	1	1.3	1
20 - 30	Till; SC	1	1.9	1	1.7	1
30 - 40	Till; SC	1	2.1	1	1.7	1
				Rimbey		
0 - 4	Alluvial lacustrine/till; L, SiL, CL	12	1.2	12	0.7	12
4 - 10	Till; CL, SC	12	2.0	12	0.5	12

SOIL SUBGROUP: Orthic Dark Grey (Cont.) SOIL SERIES: Winterburn

Depth, in feet	Dominant Geologic Material and Texture	No. Samples	S.A.R., Mean	No. Samples	E.C. Mean	No. Samples
0 - 4	Pitted deltaic; L, CL, SiCL, SiL, SL, LS	30	0.5	30	0.6	30
4 - 10	Pitted deltaic; SiL, SiCL	30	0.7	29	1.0	29
10 - 20	Pitted deltaic; SiL	4	0.2	1	0.9	1
20 - 30	Pitted deltaic; some till; SiL, CL	3	6.3	1	3.1	1
30 - 40	Pitted deltaic; Till, bedrock, SiL, CL	2	4.9	1	0.3	1
	Solodic Dark Grey		La Nonne			
0 - 4	Till; CL	15	1.9	15	1.0	15
4 - 10	Till, limited bedrock; CL, SC	15	1.6	14	0.9	14
10 - 20	Till & bedrock; SC	2	1.6	1	2.6	1
20 - 30	Till & bedrock; SC	2	1.9	2	2.2	2
30 - 40	Till & bedrock	2	2.1	2	1.6	2
	Black Solonetz		Camrose			
0 - 4	Till; CL	31	8.0	31	1.7	31
4 - 10	Till; CL, C	31	6.0	30	1.0	30
10 - 20	Bedrock	5	13.5	1	1.5	1
20 - 30	Bedrock	1				
			Daugh			
0 - 4	Lacustrine; C, SiC	8	12.1	8	6.5	8
4 - 10	Lacustrine, some till; SiCL, SC	8	13.3	6	6.5	6
10 - 20			14.7	1	7.2	1
20 - 30			14.3	1	3.4	1

SOIL SUBGROUP: Black Solonetz (Cont.) SOIL SERIES: Kavanagh

Depth, in feet	Dominant Geologic Material and Texture	No. Samples	S.A.R. Mean	No. Samples	E.C. Mean	No. Samples
0 - 4	Weathered bedrock; C, SC	27	10.3	27	2.2	27
4 - 10	Bedrock	27	8.7	23	1.7	23
			Wetaskwin			
0 - 4	Lacustrine; SiC, C	1	5.6	1	4.0	1
4 - 10	Till; SiCL, SC	1	6.9	1	2.8	1
	Gray Solonetz		Dnister			
0 - 4	Till; CL, SC, SiC	30	4.2	30	1.2	30
4 - 10	Till, some bedrock; SC, CL	30	4.0	30	0.9	30
10 - 20	Till & bedrock; SC, C	2	8.6	2	1.5	2
20 - 30	Bedrock & till; SC, C	2	2.2	1	0.8	1
			Kawood			
0 - 4	Weathered bedrock; C, SC	3	7.9	3	1.4	3
4 - 10	Bedrock	3	5.9	3	1.0	3
			Ministik			
0 - 4	Lacustrine; SiC	2	2.4	2	1.5	2
4 - 10	Lacustrine & Till; SC	2	1.0	2	0.4	2

SOIL SUBGROUP: Gray Solod SOIL SERIES: Thorsby

Depth, in feet	Dominant Geologic Material and Texture	No. Samples	S.A.R. Mean	No. Samples	E.C. Mean	No. Samples
0 - 4	Till; SC, CL, C	51	8.1	51	1.4	51
4 - 10	Till & bedrock; SC, C	51	9.1	51	1.0	51
10 - 20	Bedrock	10	11.1	6	1.1	6
			Cooking Lake			
0 - 4	Till; CL, C	7	1.9	7	0.6	7
4 - 10	Till; SC	7	2.2	7	0.6	7
	Dark Gray Luvisol		Leith			
0 - 4	Alluvial aeolian; SL, LS, S & Gr., SCL	5	1.1	5	0.7	5
4 - 10	Till; CL	5	1.5	5	0.6	5
10 - 20	Till & bedrock; CL	1	8.6	1	2.6	1
20 - 30	Till and bedrock; SCL, SC	1	10.5	1	0.7	1
			Uncas			
0 - 4	Till; CL	31	0.6	31	0.7	31
4 - 10	Till; CL, SC	31	0.9	31	0.5	31
10 - 20	Till; CL, SC	6	2.2	4	1.9	4
20 - 30	Till & bedrock; SC, CL	6	3.6	2	1.6	2
30 - 40	Bedrock, some till; SC	5	2.9	4	1.4	4

SOIL SUBGROUP: Brunisolic Gray Luvisol SOIL SERIES: Nicot Complex

Depth, in feet	Dominant Geologic Material and Texture	No. Samples	S.A.R. Mean	No. Samples	E.C. Mean	No. Samples
0 - 4	Alluvial aeolian; SL, LS	6	0.8	6	0.9	6
4 - 10	Alluvial aeolian till, some bedrock; SCL, CL	6	1.3	6	0.6	6
10 - 20	Till & bedrock; CL	1	3.4	1	1.5	1
20 - 30	Till & bedrock; CL	1	5.6	1	1.9	1
30 - 40	Bedrock	1	5.9	1	1.0	1
	Solidic Gray Luvisol		Nakamun			
0 - 4	Till; CL	4	0.8	4	0.5	4
4 - 10	Till; SC	4	0.9	4	0.6	4
	Orthic Humic Gleysol		Codner			
0 - 4	Alluvial lacustrine; SL, L, SiL, SCL, S	7	1.8	7	1.3	7
4 - 10	Till and alluvial lacustrine; CL, SiL, SL, S	7	1.7	7	0.7	7
			Onoway			
0 - 4	Till; CL, SCL	12	0.7	12	1.0	12
4 - 10	Till; CL	12	1.0	10	0.9	10

SOIL SUBGROUP: Orthic Humic Gleysol (Cont.) SOIL SERIES: Peaty Onoway

Depth, in feet	Dominant Geologic Material and Texture	No. Samples	S.A.R. Mean	No. Samples	E.C. Mean	No. Samples
0 - 4	Till; CL	6	0.7	6	1.4	6
4 - 10	Till; CL	6	0.9	6	0.7	6
10 - 20	Till; CL	6	1.1	1	2.4	1
20 - 30	Till; CL	1	1.7	1	2.5	1
30 - 40	Till; CL	1	2.2	1	2.8	1
			Rochester			
0 - 4	Alluvial aeolian; LS, SL	3	3.6	3	1.3	3
4 - 10	Till; CL, SCL	3	1.9	3	0.8	3
	Saline Humic Gleysol		Navarre			
0 - 4	Lacustrine; SiC	1	0.8	1	5.2	1
4 - 10	Till and lacustrine; SC	1	0.5	1	0.5	1
	Humic Eluviated Gleysol		Mapora			
0 - 4	Till; CL	4	1.0	4	0.7	4
4 - 10	Till; CL	4	0.7	4	0.5	4

APPENDIX B

SOIL PERMEABILITY RATES

PERMEABILITY RATES IN INCHES PER HOUR OF SOME REPRESENTATIVE SOIL SERIES

Soil Order Soil Subgroup Soil Series	Geologic Material	Texture (Field-Rated)	Depth (Inches)	Hydraulic Cond. (in./hr.)
Chermozemic				
Orthic Black				
Peace Hills	Aeolian	LFS	0 - 8	0.74
		FS	12 - 20	0.34
		FS	22 - 47	1.10
	Aeolian	LS	0 - 8	2.80
		S	10 - 18	5.37
		S	45 - 70	0.25
	Water worked Aeolian	SL	0 - 8	0.52
		LS	9 - 17	0.41
	Till	SCL►CL*	35 - 60	0.21
	Alluvial	SL	0 - 8	0.26
		SL	9 - 17	0.71
	Till at 35"	SCL►CL*	24 - 47	0.07
Ponoka	Alluvial-Lacustrine	L	0 - 8	0.10
		SiL	13 - 20	0.05
		L	27 - 53	0.45
		CL	48 - 76	0.01
	Alluvial-Lacustrine	SiL	0 - 8	0.05
		CL	11 - 19	0.13
	Lacustrine over Till	SiC►SiCL*	27 - 52	0.06
	Alluvial Lacustrine	L	0 - 8	0.13
		SL	11 - 19	0.16
		SiL	22 - 50	0.11
		SiL	47 - 72	0.11

* - texture is intermediate
► texture changes with depth

Soil Order Soil Subgroup Soil Series	Geologic Material	Texture (Field-Rated)	Depth (Inches)	Hydraulic Cond. (in./hr.)
Eluviated Black				
Angus Ridge	Till	L	0 - 7	0.35
		Hv. L	7 - 14	0.14
		Hv. L	16 - 52	0.08
		CL	40 - 76	0.02
	Till	L	0 - 8	0.02
		L	8 - 16	0.01
		CL	22 - 53	0.03
		CL	41 - 74	0.04
	Till	L	0 - 7	0.27
		L	7 - 14	0.05
		FSL►CL*	22 - 52	0.22
		CL	42 - 77	0.01
	Till	L	0 - 8	0.18
		L-SiL*	9 - 16	0.06
		CL	18 - 35	0.05
		CL	40 - 80	0.03
	Till	SiL	0 - 7	0.07
		SiL	7 - 14	0.01
		CL	14 - 53	0.02
Malmo	Lacustrine	SiL	0 - 8	0.05
		C	11 - 19	0.03
		C►SiCL*	20 - 48	0.02
	Alluvial - Lacustrine	SiCL	48 - 76	0.25
	Lacustrine	SiL	0 - 8	0.00
		SiCL	11 - 19	0.16
	Till	SCL	22 - 47	0.11
	Lacustrine	SiL	0 - 8	0.20
		SiCL	12 - 20	0.05
	Till	CL	20 - 45	0.06
		CL	47 - 71	0.03
Gleyed Malmo	Lacustrine	SiL	0 - 8	0.02
		CL	8 - 16	0.07
		CL►SiCL*	15 - 44	0.13
	Till	SiCL	40 - 72	0.27

Soil Order Soil Subgroup Soil Series	Geologic Material	Texture (Field-Rated)	Depth (Inches)	Hydraulic Cond. (in./hr.)
Gleyed Orthic Black				
Pibroch	Till	L	0 - 7	0.13
		CL	7 - 14	0.10
		SCL→CL*	15 - 52	0.06
		CL	41 - 76	0.01
	Till	L	0 - 7	0.05
		Hv.L	9 - 16	0.12
		CL	15 - 52	0.05
		CL	38 - 74	0.01
Falun	Till	L	0 - 8	0.21
		L→CL*	8 - 16	0.15
		CL→SCL*	17 - 43	0.10
		SCL	47 - 72	0.04
	Till	L	0 - 7	0.04
		L	7 - 14	0.04
		CL	16 - 53	0.07
		CL	38 - 76	0.00
Rimbey	Alluvial - Lacustrine	SiL	0 - 7	0.03
		SiCL	8 - 15	0.02
		SiCL	19 - 58	0.06
	Till	CL	41 - 77	0.02
	Alluvial - Lacustrine	SiL	0 - 8	0.14
		CL	11 - 19	0.03
		CL	22 - 48	0.04
		CL	43 - 70	0.03
Solonetzic				
Black Solonetz				
Camrose	Till	L	0 - 7	0.06
		CL	9 - 16	0.00
		CL	20 - 46	0.01
		CL	46 - 69	0.03
	Till	CL	0 - 7	0.01
		CL	9 - 15	0.00
	Coal at 48"	CL	21 - 46	0.02

Soil Order Soil Subgroup Soil Series	Geologic Material	Texture (Field-Rated)	Depth (Inches)	Hydraulic Cond. (in./hr.)
Duagh	Lacustrine	SiL	0 - 7	0.00
		C	8 - 16	0.00
		C	20 - 44	0.01
	Lacustrine	SiL	0 - 8	0.00
		SiC	9 - 17	0.00
		SiC	21 - 47	0.01
	Lacustrine	SiCL	0 - 7	0.00
		CL	9 - 17	0.01
		CL	20 - 44	0.02
Kavanagh	Aeolian-like	L	0 - 8	0.00
	Modified bedrock	CL	8 - 13	0.00
	Shale	C	38 - 62	0.00
	Aeolian-like	L	0 - 8	0.00
	Modified Bedrock	SCL	11 - 19	0.00
	Sandstone at 62''	SCL	36 - 59	0.00
	Modified Bedrock	CL	0 - 8	0.01
		Hv.CL	9 - 17	0.00
	Sandstone at 51''	Hv.CL	24 - 48	0.01
Wetaskwin	Lacustrine	L	0 - 8	0.14
		SiL	10 - 18	0.06
	Till	CL	21 - 46	0.02
		CL	43 - 69	0.01
Gray Solonetz				
Dinister	Till	L	0 - 6	0.08
		CL	9 - 15	0.00
		CL	22 - 49	0.00
		CL	46 - 71	0.00
Kawood	Alluvium-like	L	0 - 6	0.08
	modified bedrock	CL	10 - 16	0.01
	Sandstone at 52''	CL	24 - 48	0.01

Soil Soil Subgroup Soil Series	Geologic Material	Texture (Field-Rated)	Depth (Inches)	Hydraulic Cond. (in./hr.)
Luvisolic				
Orthic Isray Luvisol				
Cooking Lake	Till	L	0 - 8	0.13
		CL	10 - 18	0.02
	Sandstone at 60"	CL	26 - 50	0.00
Gleysolic				
Orthic Humic Gleysol				
Onoway	Till	L	0 - 7	0.04
		SCL	11 - 18	0.14
		SCL	21 - 46	0.03
		CL	43 - 69	0.01
	Till	L	0 - 8	0.10
		Hv.L	10 - 18	0.22
		CL	25 - 49	0.05
	Till	Hv.L	0 - 8	0.17
		SCL	11 - 18	0.23
		CL	25 - 48	0.01

APPENDIX C

LIMITATIONS OF IRRIGABLE SOIL CATEGORIES

Category 1 - Good Irrigation Soil

Uniform soil profile, total salt and sodium levels are nonrestrictive to plant growth, and infiltration and hydraulic conductivity are optimum for irrigation water penetration and storage. Tile drain requirements may be 860 - foot spacings, 8 feet deep to prevent salt accumulation.

Chemical and physical restrictions

	E.C.	S.A.R.	H.C. (in./hr.)
0 - 4' zone	<4 in A and B horizons <8 in C and C11 horizon	<6	0.30-1.20
4 - 8' zone	<8	<6	>0.20

Category 2 - Fair Irrigation Soil

Less uniform soil profile, total salt and sodium levels and hydraulic conductivity are partially restrictive to plant growth. Tile drain requirements may be 560 - foot spacings, 8 feet deep.

Chemical and physical restrictions

	E.C.	S.A.R.	H.C. (in./hr.)
0 - 4' zone	<4 in A and B horizons <12 in C or C11 horizon	6-9	0.12-0.30 or 1.20-2.00
4 - 8' zone	<12	6-9	>0.08

Category 3 - Marginal Irrigation Soil

Restrictions as for Category 2, however, more severe. Tile drain requirements may be 240 - foot spacings, 8 feet deep.

Chemical and physical restrictions

	E.C.	S.A.R.	H.C. (in./hr.)
0 - 4' zone	<8 in A and B horizons <12 in C or C11 horizon	9-12	0.04-0.12 2.00-2.80
4 - 8' zone	<15	9-12	>0.04

Nonirrigable Soil

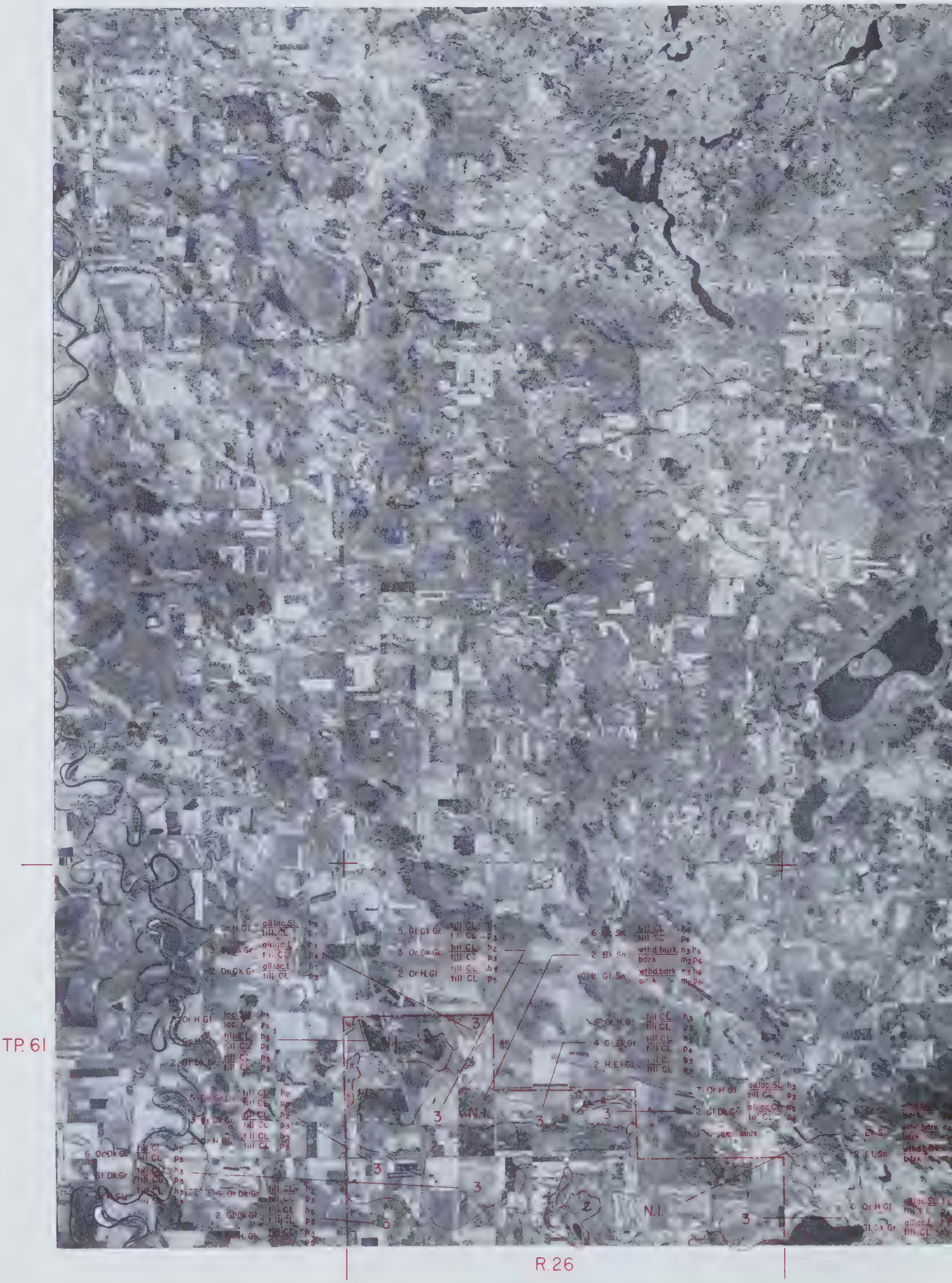
Severe chemical and physical restrictions. Good cultural practices may upgrade these soils.

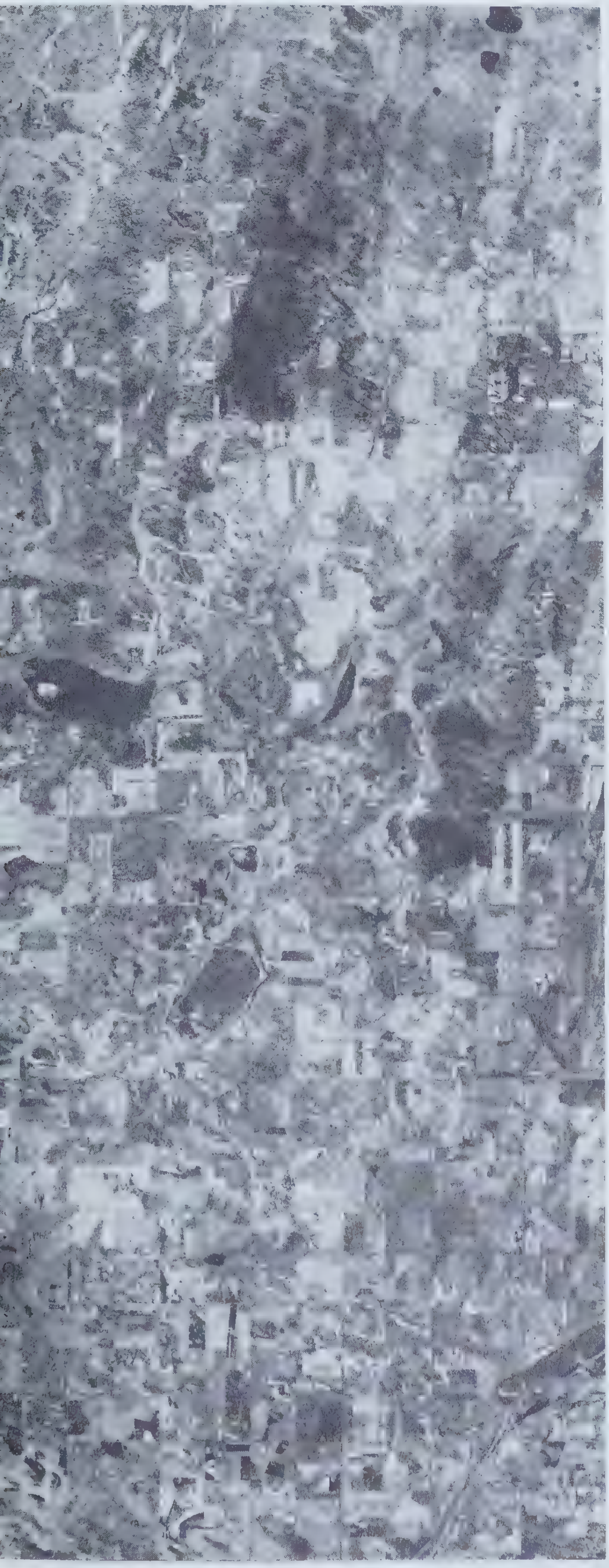
Chemical and physical restrictions

	E.C.	S.A.R.		H.C. (in./hr.)
0 - 4' zone	>8 in A and B horizons	<12		<0.04
	>16 in C or C11 horizon		or	>2.80
4 - 8' zone	>15	<12		<0.02

APPENDIX D

SOIL - IRRIGATION - CAPABILITY MAPS


TP. 61
R.26
6 Or.H.Gl gl.lac.SL till CL h3
3 Dk.Gr gl.lac.L till CL h3 p4
2 Or.Dk.Gr gl.lac.L till CL h3 p3
5 Gl.Dk.Gr till CL till CL h3 p3
3 Or.Dk.Gr till CL till CL h2 p3
2 Or.H.Gl till CL till CL p5
6 Bk.Sn till CL till SC p6
2 Bk.Sn wthd.bdrk bdrk n3 h6 m2 p6
2 Gl.Sn wthd.bdrk bdrk n3 h6
Or.H.Gl lac. lac. h3 p6
till CL till CL h3 p5
2 Or.Dk.Gr till CL till CL h3 p3
Or.H.Gl till CL till CL h3
4 Gl.Dk.Gr till CL till CL p4
2 H.El.Gl till CL till CL p3
7 Or.H.Gl gl.lac.SL till CL h3 p3
2 Gl.Dk.Gr gl.lac.CL till CL h5 p4
soils
5 Gr.L till CL till CL h2
3 Or.Dk.Gr till CL till CL h2 p3
2 Or.H.Gl till CL till CL h3 p5
6 Or.Dk.Gr till CL till CL p5
2 Gl.Dk.Gr till CL till CL h3 p3
6 Or.Dk.Gr till CL till CL h2 p3
2 Gl.Dk.Gr till CL till CL h5
6 Gr.Sn
2 Bk.S wthd bdrk bdrk
2 Gl.Sn wthd.bdrk bdrk
6 Or.H.Gl gl.lac.SL
Gl.Dk.Gr gl.lac.L till CL
N.I.
3
2



STATISTICAL SUMMARY

1 ___0___ ACRES 3 ___5,110___ ACRES
2 ___0___ ACRES N.I. ___3,590___ ACRES

LEGEND

SOIL CATEGORY — SOIL UNIT — SOIL SUBGROUP — DOMINANT GEOLOGIC MATERIAL — DOMINANT TEXTURE — PHYSICAL & CHEMICAL RESTRICTIONS

3 10 Or. Dk.Gr. $\frac{\text{al. lac.} \quad \text{CL}}{\text{till} \quad \text{CL}}$ h_2 p_3

SOIL CATEGORY

A SOIL WITH PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN OPTIMUM SOILS FOR IRRIGATION USE.(BASIC RATINGS FROM 72 to 100)________1

A SOIL WITH ONE OR MORE MODERATE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR TO GOOD SOIL FOR IRRIGATION USE.(BASIC RATING FROM 46 to 71)________2

A SOIL WITH MODERATE TO SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR SOIL FOR IRRIGATION USE.(BASIC RATING FROM 25 to 45)________3

A SOIL WITH SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A SOIL NOT SUITABLE FOR IRRIGATION USE.(BASIC RATING BELOW 25)________N.I

SYMBOLS

BASIN BOUNDARY________
SOIL BOUNDARY________
WET AREA, ORGANIC SOILS & OPEN WATER________
INFORMATION LEADER________
LEADER TO SAME AREA________

ABBREVIATIONS

SOIL COLOUR

Gr	Gray
Bk.	Black
Dk.	Dark

SOIL PROFILE

H.	Humic
Saln	Saline
El.	Eluviated
Or.	Orthic
Gl.	Gleysol
Sn.	Solonetz
So	Solod
Lu.	Luvisol

PARENT MATERIAL

aeol	aeolian
all.	alluvial
bdrk.	bedrock
lac.	lacustrine
otwsh.	outwash
p. delta	pitted deltaic
wthd.	weathered

Av.______Alluvium – Recent River Deposits

83 J-9	83 I-12	83 I-11
83 J-8	83 I-5	83 I-6
83 J-1	83 I-4	83 I-3

PHYSICAL AND CHEMICAL RESTRICTIONS

			HORIZONS to 4 ft in A, B and C							SOIL ZONES BELOW 4 ft						
CATEGORY			1	2	3	4	5	6		1	2	3	4	5	6
RATING REFERS TO E C & S.A.R (o e Saline) (n m Sodic)			Normal	Slightly Saline	Irrigation limit	Saline sodic	Highly saline	Very highly saline sodic		Normal	Slightly saline	Irrigation limit	Saline sodic	Highly saline	Very highly saline, sodic
SALINITY-E C	AB	o	<4	<4	<8	<8	<12	12	e	<8	<12	<15	<18	<21	>21
	C		<8	<12	<12	>12	<16	>16							
S A R		n	<6	6-9	9-12	12-15	15-18	>18	m	<6	6-9	9-12	12-15	15-18	>18
H. C. in/hr	AB	h	0.3 to 1.2	0.12 to 0.30	0.04 to 0.12	0.02 to 0.04	0.01 to 0.02	0.00 to 0.01	p	>0.2	>0.08	>0.04	>0.02	>0.01	<0.01
	C			1.2 to 2.0	2.0 to 2.8	2.8 to 4.0	4.0 to 6.0	>6							

N

ALBERTA DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES DIVISION

SOIL MAP
OF THE
STURGEON BASIN STUDY AREA
83 - I - 5

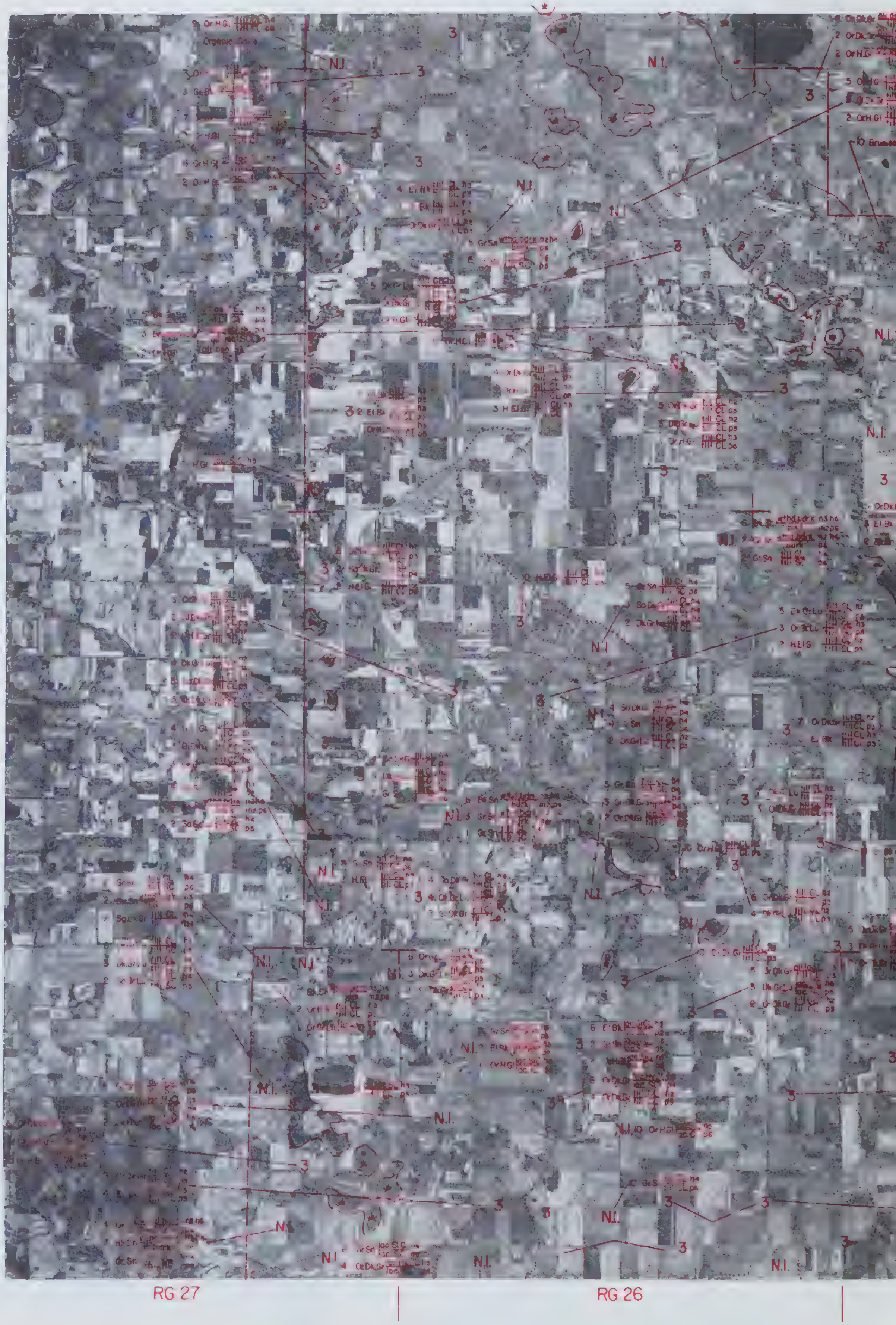
Scale: 1 Mile = Date: JULY, 1971 Sheet: 1 of 7

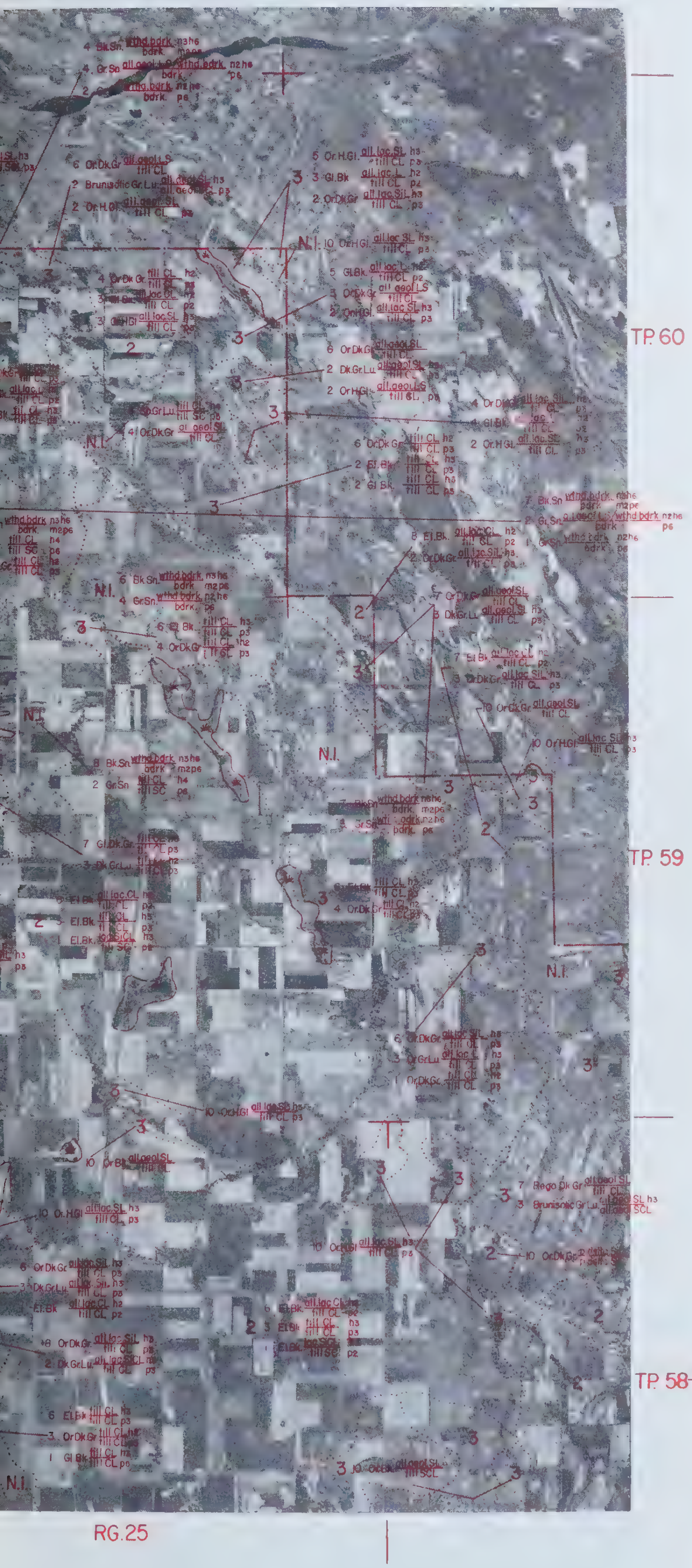
Submitted by: Henry Regier
Date: July, 1971
Approved by: R. H. Schultz
Date: July 9/71

Designed by: H. REGIER
Drawn by: N. ALEXANDER
Checked by:

File No. 200-Z-3-L-1

3955


N.I.
3
RG 27
RG 26



STATISTICAL SUMMARY

1 ____0____ ACRES 3 ___65,650___ ACRES

2 __35,290__ ACRES N.I. __45,960__ ACRES

LEGEND

SOIL CATEGORY — SOIL UNIT — SOIL SUBGROUP — DOMINANT GEOLOGIC MATERIAL — DOMINANT TEXTURE — PHYSICAL & CHEMICAL RESTRICTIONS

3 10 Or. Dk. Gr. gl. lac. CL / till CL h_2 p_3

SOIL CATEGORY

A SOIL WITH PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN OPTIMUM SOILS FOR IRRIGATION USE. (BASIC RATINGS FROM 72 to 100) ________ 1

A SOIL WITH ONE OR MORE MODERATE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR TO GOOD SOIL FOR IRRIGATION USE. (BASIC RATING FROM 46 to 71) ________ 2

A SOIL WITH MODERATE TO SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR SOIL FOR IRRIGATION USE. (BASIC RATING FROM 25 to 45) ________ 3

A SOIL WITH SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A SOIL NOT SUITABLE FOR IRRIGATION USE. (BASIC RATING BELOW 25) ________ N.I.

SYMBOLS

BASIN BOUNDARY ________ — · — · —

SOIL BOUNDARY ________ ·········

WET AREA, ORGANIC SOILS & OPEN WATER ________ — — —

INFORMATION LEADER ________ ———

LEADER TO SAME AREA ________ ———

ABBREVIATIONS

SOIL COLOUR

Gr.	Gray
Bk.	Black
Dk.	Dark

SOIL PROFILE

H	Humic
Saln	Saline
El.	Eluviated
Or.	Orthic
Gl.	Gleysol
Sn.	Solonetz
So	Solod
Lu.	Luvisol

PARENT MATERIAL

aeol	aeolian
all.	alluvial
bdrk.	bedrock
lac.	lacustrine
otwsh.	outwash
p. delta	pitted deltaic
wthd.	weathered
Av.	Alluvium – Recent River Deposits

83 J-8	83 I-5	83 I-6
83 J-1	83 I-4	83 I-3
83 G-10	83 H-13	83 H-14

PHYSICAL AND CHEMICAL RESTRICTIONS

			HORIZONS to 4 ft. in A, B and C							SOIL ZONES BELOW 4 ft.					
CATEGORY			1	2	3	4	5	6		1	2	3	4	5	6
RATING	REFERS TO E.C & S.A.R. (s e Saline) (n m Sodic)		Normal	Slightly s	Irrigation limit	Sal, sodic	Highly s	Very highly saline, sod		Normal	Slightly s	Irrigation limit	Sal, sodic	Highly s	Very highly saline, sod
SALINITY–E.C.	AB	s	< 4	< 4	< 8	< 8	< 12	> 12	e	< 8	< 12	< 15	< 18	< 21	> 21
	C		< 8	< 12	< 12	> 12	< 16	> 16							
S. A. R.		n	< 6	6 - 9	9 - 12	12 - 15	15 - 18	> 18	m	< 6	6 - 9	9 - 12	12 - 15	15 - 18	> 18
H. C. in/hr	AB	h	0.3 to 1.2	0.12 to 0.30	0.04 to 0.12	0.02 to 0.04	0.01 to 0.02	0.00 to 0.01	p	> 0.2	> 0.08	> 0.04	> 0.02	> 0.01	< 0.01
	C			1.2 to 2.0	2.0 to 2.8	2.8 to 4.0	4.0 to 6.0	> 6							

ALBERTA DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES DIVISION

SOIL MAP
OF THE
STURGEON BASIN STUDY AREA
83 - I - 4

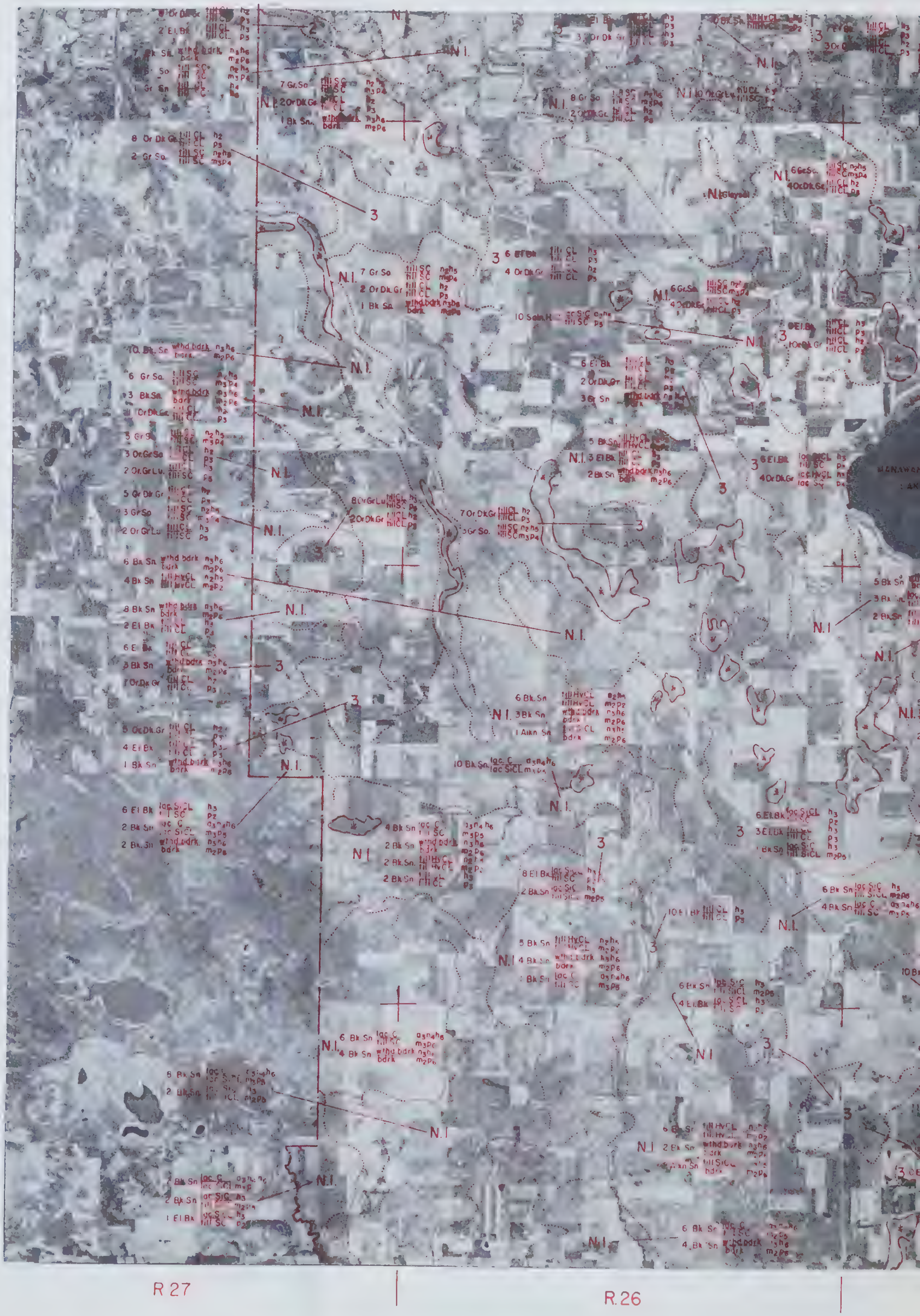
Scale: 1 Mile Date: JULY, 1971 Sheet: 2 of 7

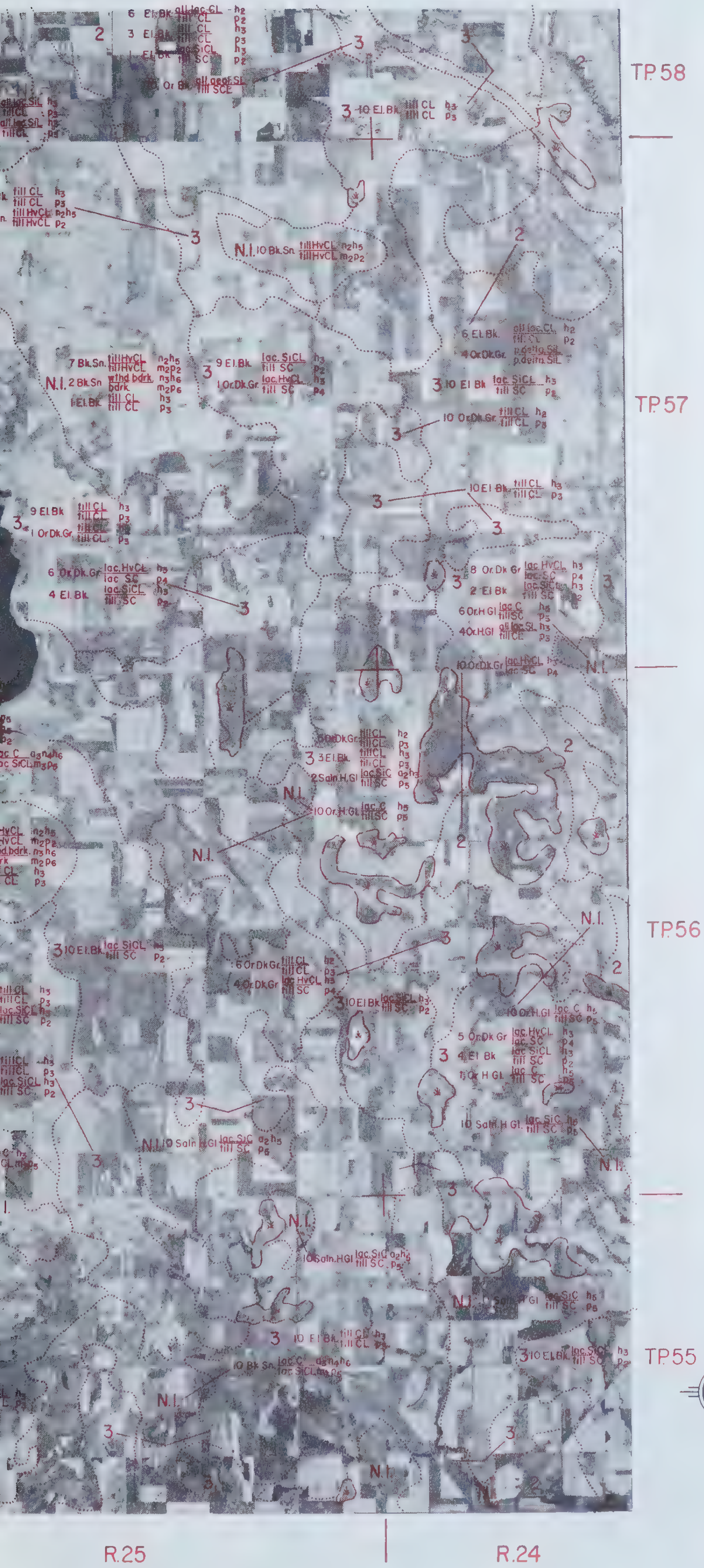
Submitted by: Henry Regier
Date: July, 1971
Approved by: R. H. Schute
Date: July 9/71

Designed by: H. REGIER
Drawn by: B. JOHNSON
Checked by:

File No. 200-Z-3-L-I

3956


R 27
R.26
N.I.
3
MANAWA
7 Gr So
2 Or Dk Gr
1 Bk Sn
8 Or Dk Gr
2 Gr So
10 Bk Sn
6 Gr So
6 El Bk
4 Or Dk Gr
5 Bk Sn
4 Bk Sn
8 Bk Sn
2 El Bk
6 Bk Sn
3 Bk Sn
1 Alkn Sn
10 Bk Sn
till SC
till CL
till HvCL
wthd bdrk
loc C
loc SiCL
h2
h3
p3
n2h5
m3p4
m2p6
n3h6


TP.58
TP.57
TP.56
TP.55
R.25
R.24
3 10 El.Bk till CL till CL h3 P3
N.I. 10 Bk.Sn. tillHvCL tillHvCL n2h5 m2P2
7 Bk.Sn. tillHvCL tillHvCL n2h5 m2P2
N.I. 2 Bk.Sn wthd.bdrk. bdrk. n3h6 m2P6
3 9 El.Bk lac.SiCL till SC
6 El.Bk gll.lac.CL till CL h2 P2
3 10 El Bk lac.SiCL till SC
10 Or.Dk.Gr. till CL till CL h2 P3
10 El Bk till CL till CL h3 P3
9 El.Bk till CL till CL h3 P3
6 Or.Dk.Gr. lac.HvCL lac SC
4 El.Bk lac.SiCL till SC
8 Or.Dk.Gr lac.HvCL lac.SC
2 El Bk lac.SiCL till SC
6 Or.H.Gl lac.C till SC
4 Or.H.Gl gll.lac.SL till CL
10 Or.Dk.Gr lac.HvCL lac SC
3 El.Bk
2 Saln.H.Gl lac.SiC till SC
10 Or.H.Gl lac.C till SC
3 10 El.Bk lac.SiCL till SC P2
6 Or.Dk.Gr till CL till CL
4 Or.Dk.Gr lac.HvCL lac SC
3 10 El Bk lac.SiCL till SC
10 Or.H.Gl lac.C till SC
5 Or.Dk.Gr lac.HvCL lac.SC
4 El Bk lac.SiCL till SC
1 Or.H.Gl lac.C till SC
10 Saln.H.Gl lac.SiC till SC
N.I. 10 Saln.H.Gl lac.SiC till SC
10 Saln.H.Gl lac.SiC till SC
3 10 El Bk till CL till CL
3 10 El.Bk lac.SiCL till SC
10 Bk.Sn. lac.C lac.SiCL
N.I.
1
2
3

STATISTICAL SUMMARY

1 ____0____ ACRES 3 ___76,440__ ACRES

2 ___9,270___ ACRES N.I. ___93,980___ ACRES

LEGEND

SOIL CATEGORY
SOIL UNIT
SOIL SUBGROUP
DOMINANT GEOLOGIC MATERIAL
DOMINANT TEXTURE
PHYSICAL & CHEMICAL RESTRICTIONS

3 10 Or. Dk.Gr. $\frac{\text{al. lac.}\ \ \text{CL}}{\text{till}\ \ \text{CL}}$ $\frac{h_2}{P_3}$

SOIL CATEGORY

A SOIL WITH PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN OPTIMUM SOILS FOR IRRIGATION USE. (BASIC RATINGS FROM 72 to 100) ______ 1

A SOIL WITH ONE OR MORE MODERATE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR TO GOOD SOIL FOR IRRIGATION USE. (BASIC RATING FROM 46 to 71) ______ 2

A SOIL WITH MODERATE TO SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR SOIL FOR IRRIGATION USE. (BASIC RATING FROM 25 to 45) ______ 3

A SOIL WITH SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A SOIL NOT SUITABLE FOR IRRIGATION USE. (BASIC RATING BELOW 25) ______ N.I.

SYMBOLS

BASIN BOUNDARY ______
SOIL BOUNDARY ______
WET AREA, ORGANIC SOILS & OPEN WATER ______
INFORMATION LEADER ______
LEADER TO SAME AREA ______

ABBREVIATIONS

SOIL COLOUR

Gr. ______ Gray
Bk. ______ Black
Dk. ______ Dark

SOIL PROFILE

H. ______ Humic
Saln. ______ Saline
El. ______ Eluviated
Or. ______ Orthic
Gl ______ Gleysol
Sn ______ Solonetz
So ______ Solod
Lu ______ Luvisol

PARENT MATERIAL

aeol. ______ aeolian
all. ______ alluvial
bdrk. ______ bedrock
lac. ______ lacustrine
otwsh. ______ outwash
p.delta ______ pitted deltaic
wthd. ______ weathered

Av ______ Alluvium - Recent River Deposits

83 J-1	83 I-4	83 I-3
83 G-10	83 H-13	83 H-14
83 G-9	83 H-12	83 H-11

PHYSICAL AND CHEMICAL RESTRICTIONS

			HORIZONS to 4 ft in A, B and C							SOIL ZONES BELOW 4 ft					
CATEGORY			1	2	3	4	5	6		1	2	3	4	5	6
RATING REFERS TO E.C. & S.A.R. (o e Saline) (n m Sodic)			Normal	Slightly S	Irrigation limit	Sal, sodic	Highly s	Very highly saline, sod		Normal	Slightly s	Irrigation limit	Sal, sodic	Highly s	Very highly saline, sod
SALINITY-E.C.	AB C	o	< 4 < 8	< 4 < 12	< 8 < 12	< 8 > 12	< 12 < 16	> 12 > 16	e	< 8	< 12	< 15	< 18	< 21	> 21
S A R		n	< 6	6 - 9	9 - 12	12 - 15	15 - 18	> 18	m	< 6	6 - 9	9 - 12	< 15	15 - 18	> 18
H. C. in/hr	AB C	h	0.3 to 1.2	0.12 to 0.30 1.2 to 2.0	0.04 to 0.12 2.0 to 2.8	0.02 to 0.04 2.8 to 4.0	0.01 to 0.02 4.0 to 6.0	0.00 to 0.01 > 6	p	>0.2	>0.08	>0.04	>0.02	>0.01	<0.01

ALBERTA DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES DIVISION

SOIL MAP
OF THE
STURGEON BASIN STUDY AREA
83 - H - 13

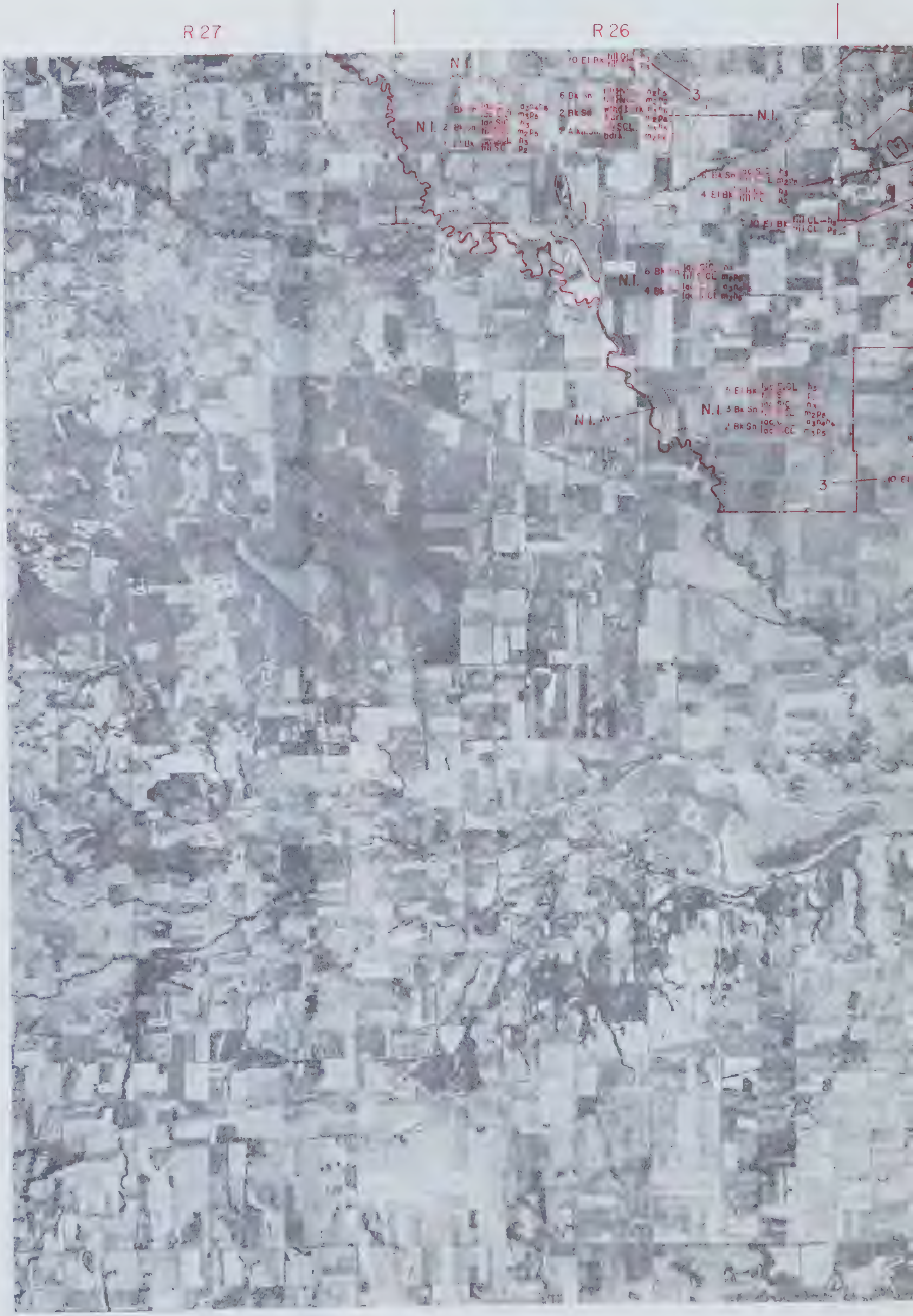
Scale: 1 Mile = Date: JULY, 1971 Sheet: 3 of 7

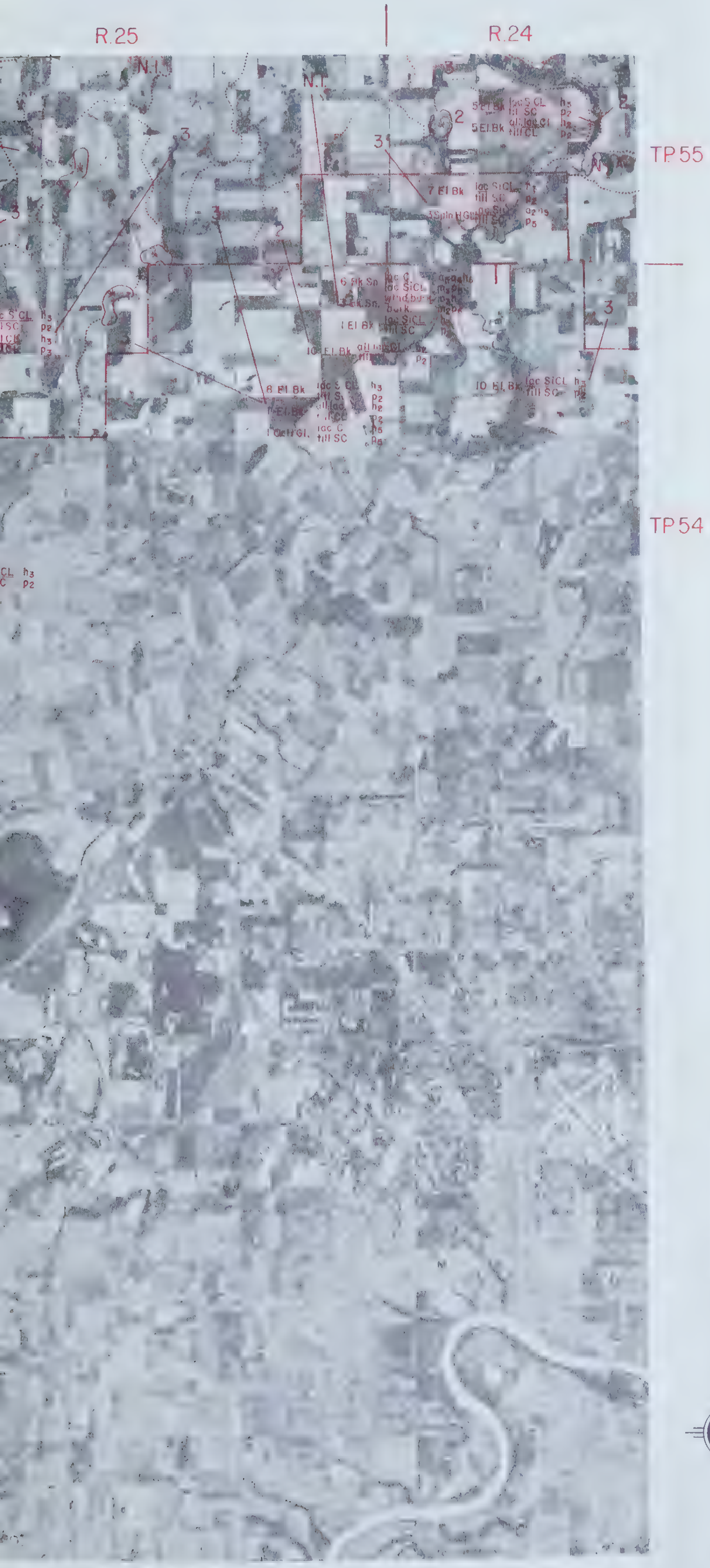
Submitted by: Henry Regier
Date: July, 1971
Approved by: B. H. Schula
Date: July 9, '71

Designed by: H. REGIER
Drawn by: N. ALEXANDER
Checked by:

File No. 200-Z-3-L-1

3957


R 27
R 26
N.I.
10 El Bk
3
6 Bk Sn
2 Bk Sn
N.I.
N.I.
2 Bk Sn
6 Bk Sn
4 El Bk
3
10 El Bk
fill CL
fill CL
N.I.
6 Bk Sn
4 Bk
N.I. Av
N.I.
3 Bk Sn
2 Bk Sn
3
10 El



STATISTICAL SUMMARY

1 ......0...... ACRES
3 ....6,480.... ACRES
2 ...1,810..... ACRES
N.I. ..24,630..... ACRES

LEGEND

SOIL CATEGORY — SOIL UNIT — SOIL SUBGROUP — DOMINANT GEOLOGIC MATERIAL — DOMINANT TEXTURE — PHYSICAL & CHEMICAL RESTRICTIONS

3 10 Or. Dk. Gr. al. lac. CL / till CL h_2 / P_3

SOIL CATEGORY

A SOIL WITH PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN OPTIMUM SOILS FOR IRRIGATION USE. (BASIC RATINGS FROM 72 to 100) 1

A SOIL WITH ONE OR MORE MODERATE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR TO GOOD SOIL FOR IRRIGATION USE. (BASIC RATING FROM 46 to 71) 2

A SOIL WITH MODERATE TO SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR SOIL FOR IRRIGATION USE (BASIC RATING FROM 25 to 45) 3

A SOIL WITH SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A SOIL NOT SUITABLE FOR IRRIGATION USE (BASIC RATING BELOW 25) .... N.I.

SYMBOLS

BASIN BOUNDARY
SOIL BOUNDARY
WET AREA, ORGANIC SOILS & OPEN WATER
INFORMATION LEADER
LEADER TO SAME AREA

ABBREVIATIONS

SOIL COLOUR

Gr	Gray
Bk	Black
Dk	Dark

SOIL PROFILE

H	Humic
Saln	Saline
El	Eluviated
Or	Orthic
Gl	Gleysol
Sn	Solonetz
So	Solod
Lu	Luvisol

PARENT MATERIAL

aeol	aeolian
all	alluvial
bdrk	bedrock
lac	lacustrine
otwsh	outwash
p.delta	pitted deltaic
wthd	weathered

Av. ...... Alluvium – Recent River Deposits

83 G-16	83 H-13	83 H-14
83 G-9	83 H-12	83 H-11
83 G-8	83 H-5	83 H-6

PHYSICAL AND CHEMICAL RESTRICTIONS

			HORIZONS to 4 ft. in A, B and C							SOIL ZONES BELOW 4 ft.					
CATEGORY			1	2	3	4	5	6		1	2	3	4	5	6
RATING refers to E C & S.A.R (a e Saline) (n m Sodic)			Normal	Slightly S	[illegible]	Sa sodic	Highly s	Very highly saline sodic		Normal	Slightly s	[illegible]	So sodic	Highly s	Very highly saline, sodic
SALINITY-E C	AB	a	< 4	< 4	< 8	< 8	< 12	> 12	e	< 8	< 12	< 15	< 18	< 21	> 21
	C		< 8	< 12	< 12	> 12	< 16	> 16							
S A R		n	< 6	6-9	[illegible]	[illegible]	[illegible]	> 8	m	< 6	6-9	[illegible]	[illegible]	5-8	> 8
H. C. in/hr	AB	h	0.3 to 1.2	0.12 to 0.30	0.04 to 0.12	0.02 to 0.04	0.01 to 0.02	0.00 to 0.0	p	>0.2	>0.08	>0.04	>0.02	>0.01	<0.01
	C			1.2 to 2.0	2.0 to 2.8	2.8 to 4.0	4.0 to 6.0	> 6							

ALBERTA DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES DIVISION

SOIL MAP
OF THE
STURGEON BASIN STUDY AREA
83 - H - 12

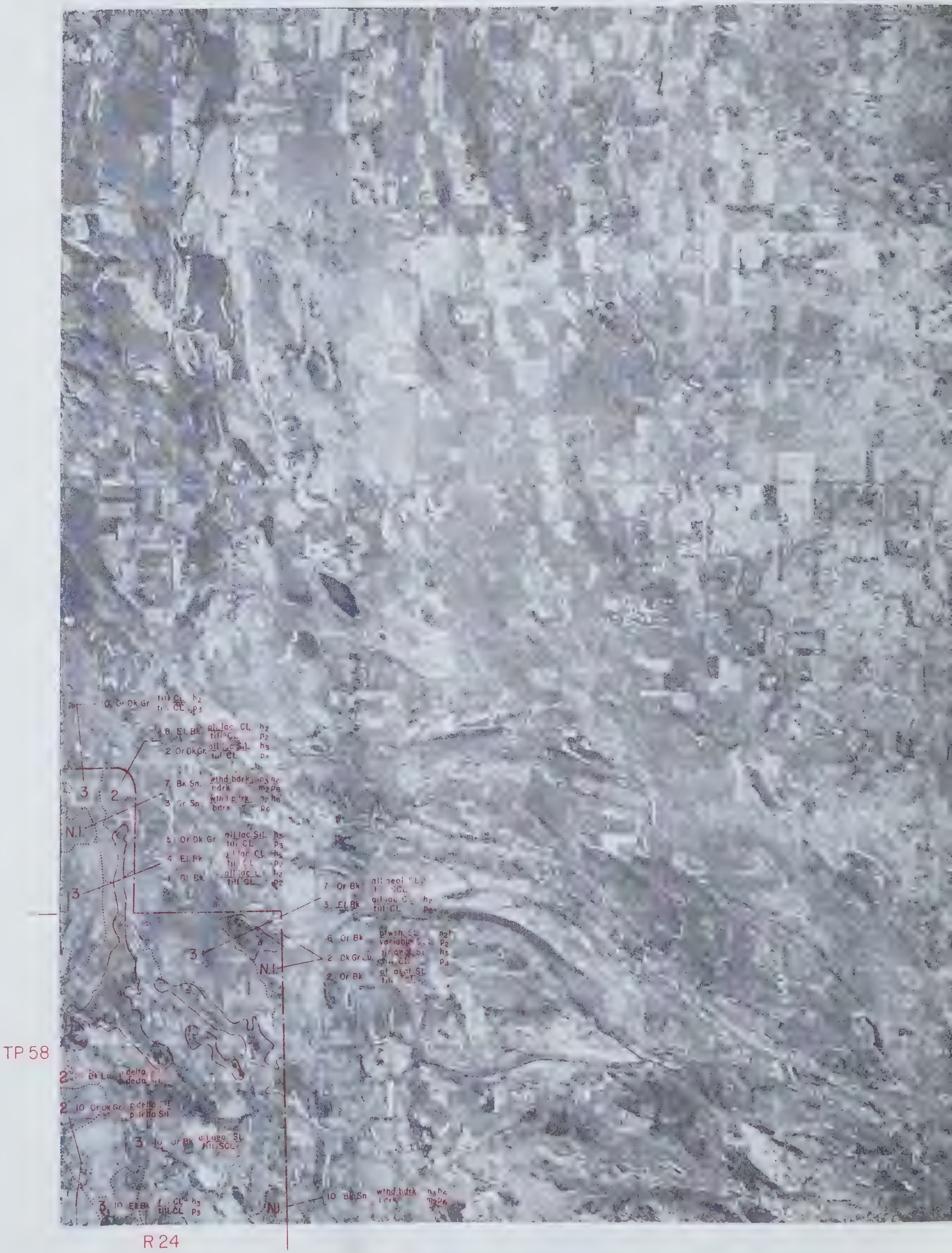
Scale: 1 Mile =
Date: JULY, 1971
Sheet. 4 of 7

Submitted by: Henry Regier
Date: July, 1971
Approved by: R.H. Schule
Date: July 9/71

Designed by: H. REGIER
Drawn by: N. ALEXANDER
Checked by:

File No. 200-Z-3-L-1

3958


10 Or Dk Gr till CL h2 till CL p3
8 El Bk gl lac CL h2 till CL p2
2 Or Dk Gr gl lac SiL h3 till CL p3
3
2
7 Bk Sn wthd bdrk h3 h6 bdrk m2 p6
3 Gr Sn wthd bdrk h2 h6 bdrk p6
N.I.
5 Or Dk Gr gl lac SiL h3 till CL p3
4 El Bk gl lac CL h2 till CL p2
1 Gl Bk gl lac L h2 till CL p2
3
7 Or Bk gl geol SL till SCL
3 El Bk gl lac CL h2 till CL p2
3
N.I.
6 Or Bk glwsh SL h2 variable p2
2 Dk Gr L gl geol SL h3 till CL p3
2 Or Bk gl geol SL till
TP 58
2 Dk L delta delta
2 10 Or Dk Gr delta delta SiL
3 10 Or Bk gl lac SL till SCL
3 10 El Bk CL h3 till CL p3
N.I.
10 Bk Sn wthd bdrk h3 h6 bdrk m2 p6
R 24

STATISTICAL SUMMARY

1 ____0____ ACRES 3 ____7,490____ ACRES

2 ____890____ ACRES N.I. ____2,660____ ACRES

LEGEND

SOIL CATEGORY
SOIL UNIT
SOIL SUBGROUP
DOMINANT GEOLOGIC MATERIAL
DOMINANT TEXTURE
PHYSICAL & CHEMICAL RESTRICTIONS

3 10 Or. Dk. Gr. $\frac{\text{al. lac.}\ \ \text{CL}}{\text{till}\ \ \text{CL}}$ h_2 p_3

SOIL CATEGORY

A SOIL WITH PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN OPTIMUM SOILS FOR IRRIGATION USE. (BASIC RATINGS FROM 72 to 100) ________ 1

A SOIL WITH ONE OR MORE MODERATE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR TO GOOD SOIL FOR IRRIGATION USE. (BASIC RATING FROM 46 to 71) ________ 2

A SOIL WITH MODERATE TO SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR SOIL FOR IRRIGATION USE. (BASIC RATING FROM 25 to 45) ________ 3

A SOIL WITH SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A SOIL NOT SUITABLE FOR IRRIGATION USE. (BASIC RATING BELOW 25) ________ N.I.

SYMBOLS

BASIN BOUNDARY
SOIL BOUNDARY
WET AREA, ORGANIC SOILS & OPEN WATER
INFORMATION LEADER
LEADER TO SAME AREA

ABBREVIATIONS

SOIL COLOUR

Gr	Gray
Bk	Black
Dk	Dark

SOIL PROFILE

H	Humic
Sain	Saline
E	Eluviated
Or	Orthic
Gl	Gleysol
Sn	Solonetz
So	Solod
Lu	Luvisol

PARENT MATERIAL

aeol	aeolian
all	alluvial
bdrk	bedrock
lac	lacustrine
otwsh	outwash
p.delta	pitted deltaic
wthd	weathered
Av	Alluvium – Recent River Deposits

83 I-5	83 I-6	83 I-7
83 I-4	83 I-3	83 I-2
83 H-13	83 H-14	83 H-15

PHYSICAL AND CHEMICAL RESTRICTIONS

HORIZONS to 4 ft. in A, B and C									SOIL ZONES BELOW 4 ft.						
CATEGORY			1	2	3	4	5	6		1	2	3	4	5	6
RATING	REFERS TO E.C. & S.A.R. (a e Saline) (n m Sodic)		Normal	Slightly S	Irrigation lim	Sal, sodic	Highly s	Very highly saline, sod		Normal	Slightly s	Irrigation lim	So sodic	Highly s	Very highly saline, sod
SALINITY-E.C.	AB	a	< 4	< 4	< 8	< 8	< 12	> 12	e	< 8	< 2	< 5	< 18	< 21	> 21
	C		< 8	< 12	< 12	> 12	< 16	> 16							
S A R		n	< 6	6-9	9-12	12-15	15-18	> 18	m	< 6	6-9	9-12	12-15	15-18	> 18
H. C. in/hr	AB	h	0.3 to 1.2	0.12 to 0.30	0.04 to 0.12	0.02 to 0.04	0.01 to 0.02	0.00 to 0.01	p	> 0.2	> 0.08	> 0.04	> 0.02	> 0.01	< 0.01
	C			1.2 to 2.0	2.0 to 2.8	2.8 to 4.0	4.0 to 6.0	> 6							

N

ALBERTA DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES DIVISION

SOIL MAP
OF THE
STURGEON BASIN STUDY AREA
83 - I - 3

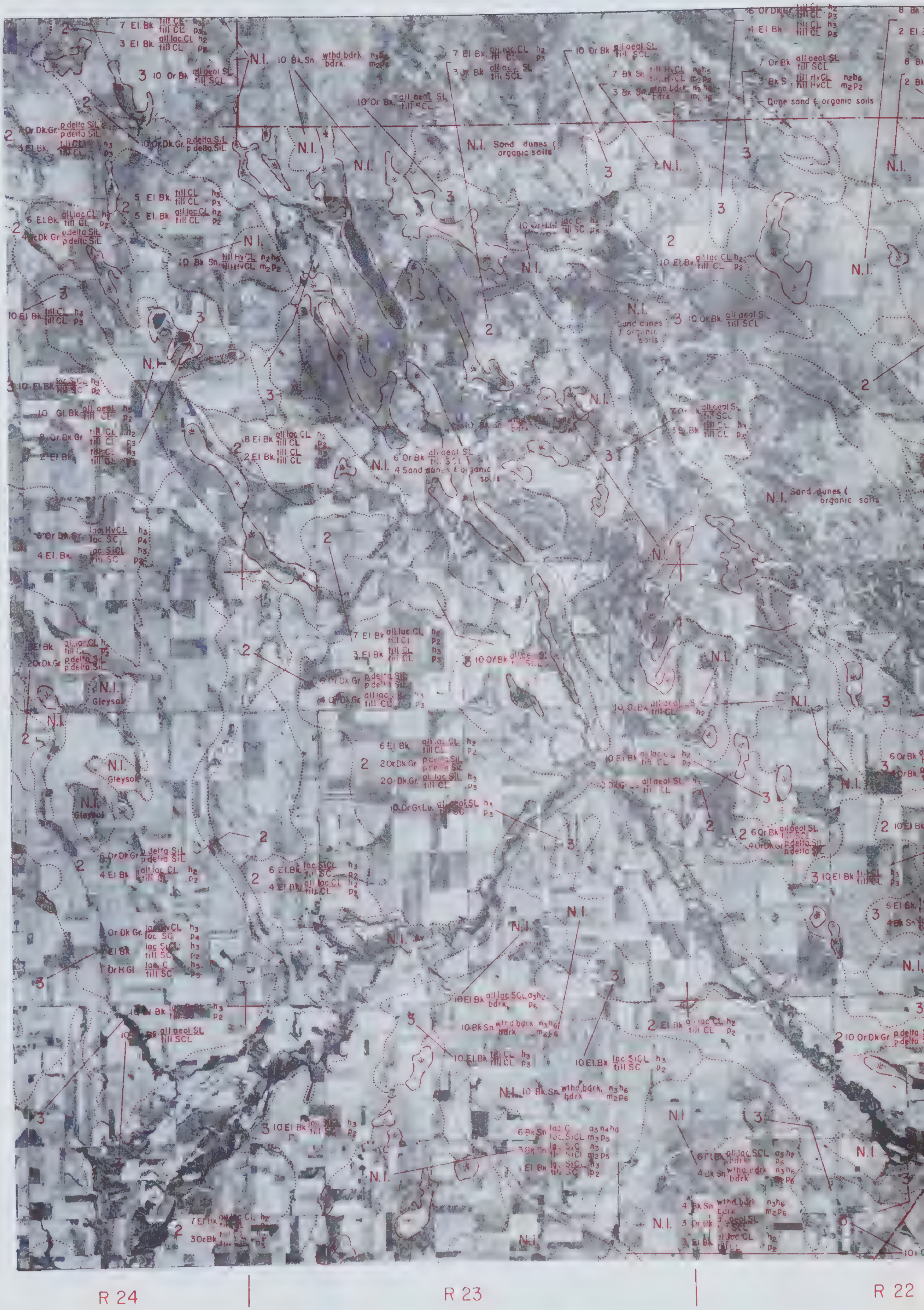
Scale: 1 Mile =
Date: JULY, 1971
Sheet: 5 of 7

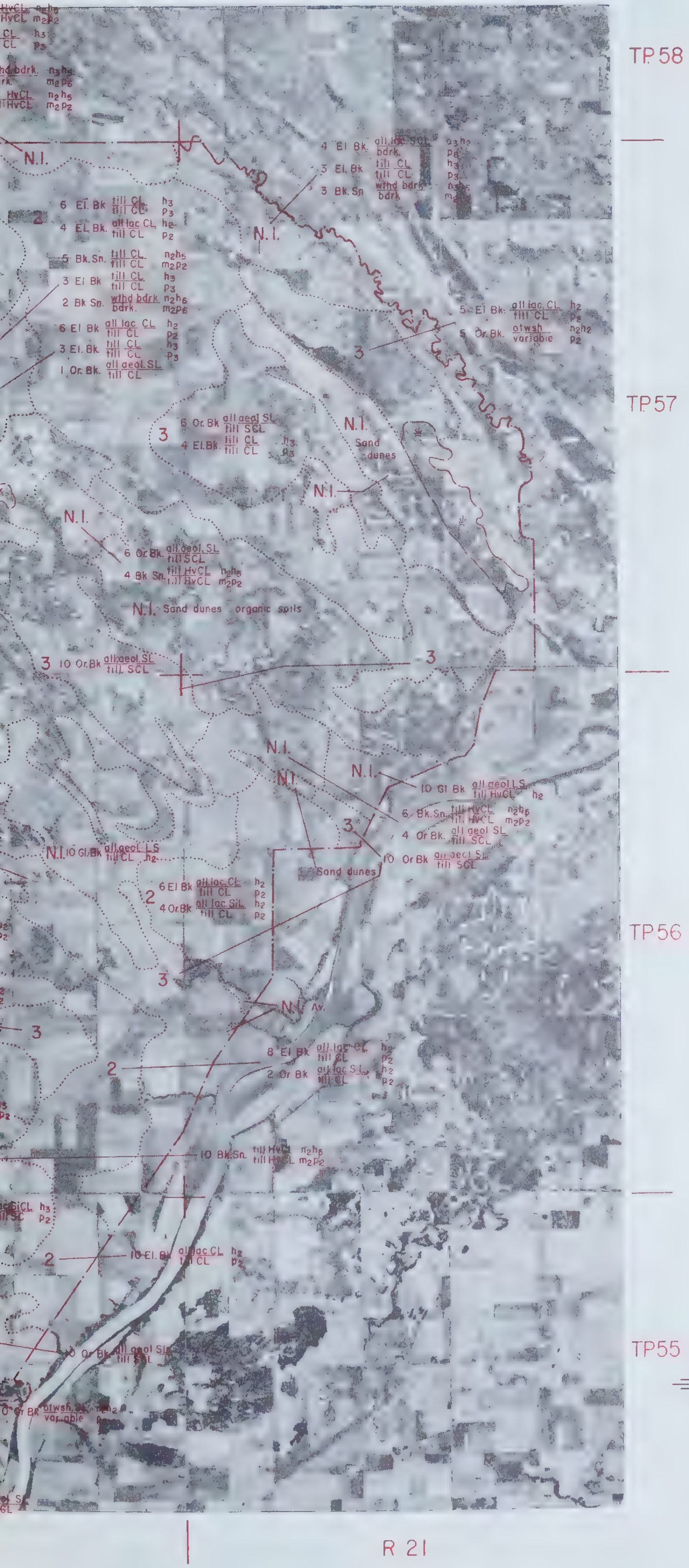
Submitted by: Henry Regier
Date: July, 1971
Approved by: R. H. Schulz
Date: July 9/71

Designed by: H. REGIER
Drawn by: N. ALEXANDER
Checked by:

File No. 200-Z-3-L-1

3959


7 El Bk. till CL / till CL p3
3 El Bk. all.lac.CL / till CL h2 p2
3 10 Or Bk all geol SL / till SCL
N.I. 10 Bk Sn wthd bdrk / bdrk n3h6 m2p6
7 El Bk all lac CL / till CL h2 p3
3 Bk all geol SL / till SCL
10 Or Bk all geol SL / till SCL
7 Bk Sn till HvCL / till HvCL n2h5 m2p2
3 Bk Sn wthd bdrk / bdrk
4 El Bk till CL / till CL h3 p3
7 Or Bk all geol SL / till SCL
3 Bk S till HvCL / till HvCL n2h5 m2p2
Dune sand & organic soils
10 Or Bk all geol SL / till SCL
Or Dk Gr p delta SiL / p delta SiL
3 El Bk till CL / till CL h3 p3
10 Or Dk Gr p delta SiL / p delta SiL
N.I.
N.I. Sand dunes & organic soils
5 El Bk till CL / till CL h3 p3
5 El Bk all lac CL / till CL h2 p2
6 El Bk all lac CL / till CL h2 p2
4 Or Dk Gr p delta SiL / p delta SiL
10 Bk Sn till HvCL / till HvCL n2h5 m2p2
10 Or H Gl lac C / till SC h2 p3
10 El Bk all lac CL / till CL h2 p2
10 El Bk till CL / till CL h3 p3
N.I. Sand dunes & organic soils
3 10 Or Bk all geol SL / till SCL
10 El Bk lac SCL / till SC h3 p2
10 Gl Bk all geol / till CL h2 p2
8 Or Dk Gr till CL / till CL h2 p3
2 El Bk till CL / till CL h3
8 El Bk all lac CL / till CL h2 p2
2 El Bk till CL / till CL
6 Or Bk all geol SL / till SCL
4 Sand dunes & organic soils
3 El Bk till CL / till CL h3 p3
N.I. Sand dunes & organic soils
6 Or Dk Gr lac HvCL / lac SC h3 p4
4 El Bk lac SiCL / till SC h3 p2
7 El Bk all lac CL / till CL h2 p2
3 El Bk till CL / till CL h3 p3
10 Or Bk all geol SL / till SCL
El Bk all lac CL / till CL h2 p2
2 Or Dk Gr p delta SiL / p delta SiL
N.I. Gleysol
6 Or Dk Gr p delta SiL / p delta SiL
4 Or Dk Gr all lac CL / till CL p3
6 El Bk all lac CL / till CL h2 p2
2 Or Dk Gr p delta SiL / p delta SiL
2 Or Dk Gr all lac SiL / till CL h3 p3
10 Or Gl Lu all geol SL / till SC h3 p3
10 El Bk all lac CL / till CL h2 p2
10 Or Gl all geol SL / till CL
6 Or Bk all geol SL / till SCL
4 Or Dk Gr p delta SiL / p delta SiL
10 El Bk till CL / till CL h3 p3
6 Or Dk Gr p delta SiL / p delta SiL
4 El Bk all lac CL / till SC h2 p2
6 El Bk lac SiCL / till SC h3 p2
4 El Bk all lac CL / till CL h2 p2
Or Dk Gr lac HvCL / lac SC h3 p4
El Bk lac SiCL / till SC h3 p2
Or H Gl lac C / till SC h5 p3
10 El Bk all lac SCL / bdrk a3h2 p6
10 Bk Sn wthd bdrk / bdrk n3h6 m2p6
10 El Bk till CL / till CL h3 p3
10 El Bk lac SiCL / till SC h3 p2
2 El Bk all lac CL / till CL h2 p2
2 10 Or Dk Gr p delta SiL / p delta SiL
10 Or Bk all geol SL / till SCL
N.I. 10 Bk Sn wthd bdrk / bdrk n3h6 m2p6
3 10 El Bk lac SiCL / till SC h3 p2
6 Bk Sn lac C / lac SiCL a3n4h6 m3p5
3 Bk Sn lac C / lac SiCL n3 m2p5
El Bk lac SiCL / till SC h3 p2
6 El Bk all lac SCL / bdrk a3h2 p6
4 Bk Sn wthd bdrk / bdrk n3h6 m2p6
4 Bk Sn wthd bdrk / bdrk n3h6 m2p6
3 Or Bk all geol SL / till SCL
3 El Bk all lac CL / till CL h2 p2
7 El Bk all lac CL / till CL h2
3 Or Bk till CL p3
N.I.
R 24
R 23
R 22


TP 58
TP 57
TP 56
TP 55
R 21
N.I.
4 El Bk all. lac. SCL / bdrk. n3 h2 p6
3 El. Bk till CL / till CL h3 p3
3 Bk. Sn withd bdrk / bdrk n2 h6 m2 p6
6 El. Bk till CL / till CL h3 p3
4 El. Bk. all lac CL / till CL h2 p2
5 Bk. Sn. till CL / till CL n2 h5 m2 p2
3 El Bk till CL / till CL h3 p3
2 Bk Sn. withd bdrk / bdrk. n2 h6 m2 p6
6 El Bk all lac CL / till CL h2 p2
3 El. Bk till CL / till CL h3 p3
1 Or. Bk. all aeol. SL / till CL
5 El Bk. all lac. CL / till CL h2 p2
5 Or. Bk. otwsh / variable n2 h2 p2
3
6 Or. Bk all aeol SL / till SCL
4 El. Bk. till CL / till CL h3 p3
N.I. Sand dunes
6 Or. Bk. all. aeol. SL / till SCL
4 Bk Sn. till HvCL / till HvCL n2 h5 m2 p2
N.I. Sand dunes organic soils
3 10 Or. Bk all. aeol. SL / till SCL
10 Gl Bk all aeol LS / till HvCL h2
6 Bk. Sn. till HvCL / till HvCL n2 h5 m2 p2
4 Or Bk. all aeol SL / till SCL
10 Or Bk all aeol SL / till SCL
Sand dunes
N.I. 10 Gl. Bk all. aeol. LS / till CL h2
2 6 El Bk all. lac. CL / till CL h2 p2
4 Or. Bk all. lac. SiL / till CL h2 p2
N.I. Av.
8 El Bk all. lac. CL / till CL h2 p2
2 Or Bk all. lac. SL / till CL h2 p2
10 Bk. Sn. till HvCL / till HvCL n2 h5 m2 p2
10 El. Bk all. lac. CL / till CL h2 p2
10 Or Bk all aeol SL / till SCL
10 Or Bk otwsh. SL / variable n2 h2

STATISTICAL SUMMARY

1	0 ACRES	3	53,670 ACRES
2	53,060 ACRES	N.I.	60,860 ACRES

LEGEND

SOIL CATEGORY — SOIL UNIT — SOIL SUBGROUP — DOMINANT GEOLOGIC MATERIAL — DOMINANT TEXTURE — PHYSICAL & CHEMICAL RESTRICTIONS

3 10 Or. Dk. Gr. $\frac{\text{al. lac. CL}}{\text{till CL}}$ h_2 p_3

SOIL CATEGORY

A SOIL WITH PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN OPTIMUM SOILS FOR IRRIGATION USE. (BASIC RATINGS FROM 72 to 100) ---------- 1

A SOIL WITH ONE OR MORE MODERATE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR TO GOOD SOIL FOR IRRIGATION USE. (BASIC RATING FROM 46 to 71) ---------- 2

A SOIL WITH MODERATE TO SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR SOIL FOR IRRIGATION USE. (BASIC RATING FROM 25 to 45) ---------- 3

A SOIL WITH SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A SOIL NOT SUITABLE FOR IRRIGATION USE. (BASIC RATING BELOW 25) ---------- N.I.

SYMBOLS

- BASIN BOUNDARY ---------- — · — · —
- SOIL BOUNDARY ---------- ··········
- WET AREA, ORGANIC SOILS & OPEN WATER ---------- ⌒⌒
- INFORMATION LEADER ---------- ——
- LEADER TO SAME AREA ---------- ——

ABBREVIATIONS

SOIL COLOUR

Gr.	Gray
Bk.	Black
Dk	Dark

SOIL PROFILE

H	Humic
Saln	Saline
El	Eluviated
Or	Orthic
Gl	Gleysol
Sn	Solonetz
So	Solod
Lu	Luvisol

PARENT MATERIAL

aeol	aeolian
all	alluvial
bdrk	bedrock
lac	lacustrine
otwsh	outwash
p. delta	pitted deltaic
wthd.	weathered

Av. ------ Alluvium – Recent River Deposits

83 1-4	83 1-3	83 1-2
83 H-13	83 H-14	83 H-15
83 H-12	83 H-11	83 H-10

PHYSICAL AND CHEMICAL RESTRICTIONS

			HORIZONS to 4 ft. in A, B and C							SOIL ZONES BELOW 4 ft.					
CATEGORY			1	2	3	4	5	6		1	2	3	4	5	6
RATING	REFERS TO E C & S A R (a e Saline) (n m Sodic)		Normal	Slightly S.	Irrigation limit	Sal. sodic	Highly s	Very highly saline, sod		Normal	Slightly s	Irrigation limit	Sal. sodic	Highly s.	Very highly saline, sod
SALINITY-E.C.	AB C	a	< 4 < 8	< 4 < 12	< 8 < 12	< 8 > 12	< 12 < 16	> 12 > 16	e	< 8	< 12	< 15	< 18	< 21	> 21
S. A. R.		n	< 6	6-9	9-12	12-15	15-18	> 18	m	< 6	6-9	9-12	12-15	15-18	> 18
H. C. in/hr	AB C	h	0.3 to 1.2	0.12 to 0.30 1.2 to 2.0	0.04 to 0.12 2.0 to 2.8	0.02 to 0.04 2.8 to 4.0	0.01 to 0.02 4.0 to 6.0	0.00 to 0.01 > 6	p	> 0.2	> 0.08	> 0.04	> 0.02	> 0.01	< 0.01

ALBERTA DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES DIVISION

SOIL MAP
OF THE
STURGEON BASIN STUDY AREA
83- H -14

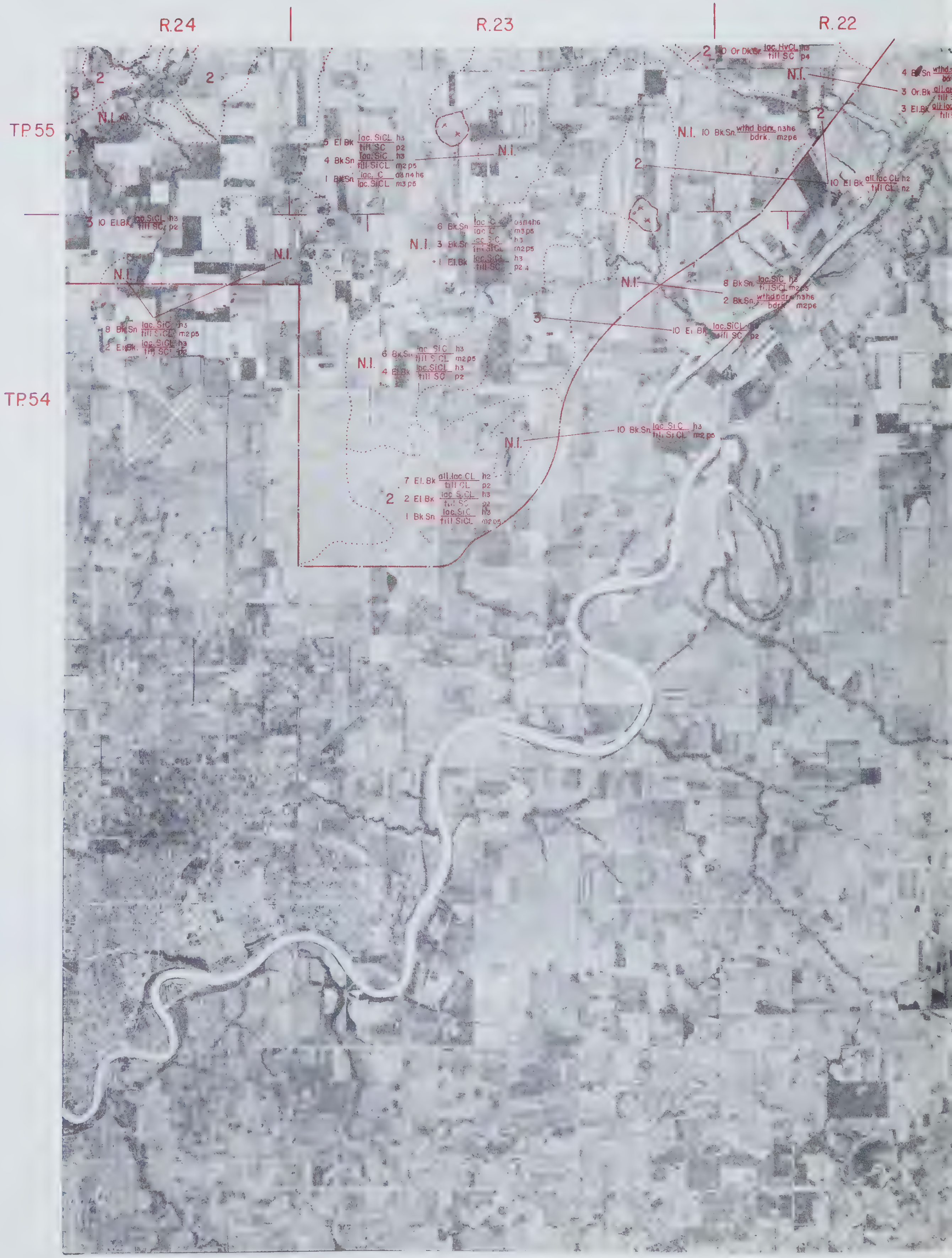
Scale: 1 Mile = | Date. JULY, 1971 | Sheet: 6 of 7

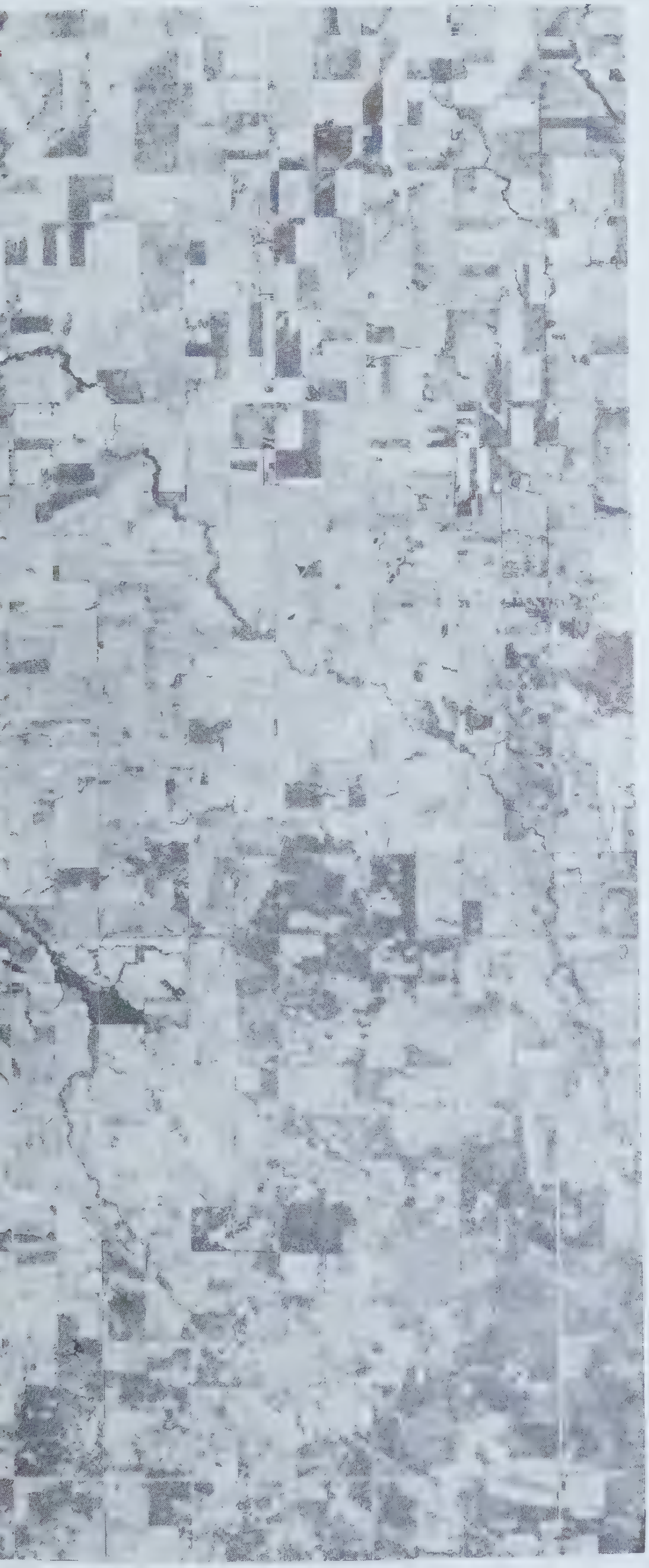
Submitted by: Henry Regier
Date: July, 1971
Approved by: R. H. Schulz
Date: July 9/71

Designed by: H. REGIER
Drawn by: N. ALEXANDER
Checked by:

File No. 200-Z-3-L-1

3960


R.24
R.23
R.22
TP.55
TP.54
N.I.
3 10 El.Bk loc.SiCL h3 till SC p2
8 Bk.Sn loc.SiC h3 till SiCL m2p5
2 El.Bk loc.SiCL h3 till SC p2
5 El Bk loc. SiCL h3 till SC p2
4 Bk.Sn loc. SiC h3 till SiCL m2p5
1 Bk.Sn loc. C d3n4h6 loc. SiCL m3p6
6 Bk.Sn 3 Bk.Sn 1 El.Bk
6 Bk.Sn loc. SiC h3 till S CL m2p5
4 El.Bk loc.SiCL h3 till SC p2
7 El.Bk all.loc.CL h2 till CL p2
2 El.Bk loc. S CL h3 till SC p2
1 Bk.Sn loc.SiC h3 till SiCL m2p5
10 Bk.Sn loc. SiC h3 till SiCL m2p5
10 El.Bk loc.SiCL h3 till SC p2
8 Bk.Sn loc.SiC h3 till SiCL m2p5
2 Bk.Sn wthd.bdrk. n3h6 bdrk. m2p6
10 Or.Dk.Gr. loc.HvCL h3 till SC p4
N.I. 10 Bk.Sn wthd.bdrk. n3h6 bdrk. m2p6
10 El.Bk all.loc.CL h2 till CL n2
4 Bk.Sn
3 Or.Bk
3 El.Bk



STATISTICAL SUMMARY

1 ____0____ ACRES 3 ____6,680____ ACRES
2 ____2,670____ ACRES N.I. ____23,380____ ACRES

LEGEND

SOIL CATEGORY
SOIL UNIT
SOIL SUBGROUP
DOMINANT GEOLOGIC MATERIAL
DOMINANT TEXTURE
PHYSICAL & CHEMICAL RESTRICTIONS

3 10 Or. Dk. Gr. $\frac{\text{al. lac.}\quad \text{CL}}{\text{till}\quad \text{CL}}$ h_2 p_3

SOIL CATEGORY

A SOIL WITH PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN OPTIMUM SOILS FOR IRRIGATION USE. (BASIC RATINGS FROM 72 to 100) ________ 1

A SOIL WITH ONE OR MORE MODERATE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR TO GOOD SOIL FOR IRRIGATION USE. (BASIC RATING FROM 46 to 71) ________ 2

A SOIL WITH MODERATE TO SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A FAIR SOIL FOR IRRIGATION USE. (BASIC RATING FROM 25 to 45) ________ 3

A SOIL WITH SEVERE RESTRICTIONS IN PROFILE CHARACTERISTICS, SALT STATUS, HYDRAULIC CONDUCTIVITY AND WATER HOLDING CAPACITY WHICH RESULTS IN A SOIL NOT SUITABLE FOR IRRIGATION USE. (BASIC RATING BELOW 25) ________ N.I.

SYMBOLS

BASIN BOUNDARY ________
SOIL BOUNDARY ________
WET AREA, ORGANIC SOILS & OPEN WATER ________
INFORMATION LEADER ________
LEADER TO SAME AREA ________

ABBREVIATIONS

SOIL COLOUR

Gr	Gray
Bk	Black
Dk	Dark

SOIL PROFILE

H.	Humic
Saln.	Saline
El.	Eluviated
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So	Solod
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PARENT MATERIAL

aeol	aeolian
all	alluvial
bdrk	bedrock
lac.	lacustrine
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p. delta	pitted deltaic
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Av. ______ Alluvium – Recent River Deposits

83 H-13	83 H-14	83 H-15
83 H-12	83 H-11	83 H-10
83 H-5	83 H-6	83 H-7

PHYSICAL AND CHEMICAL RESTRICTIONS

HORIZONS to 4 ft. in A, B and C									SOIL ZONES BELOW 4 ft.						
CATEGORY			1	2	3	4	5	6		1	2	3	4	5	6
RATING REFERS TO E.C & S.A.R (a e Saline) (n m Sodic)			Normal	Slightly S	Irrigation limit	Sal, sodic	Highly s	Very highly saline, sod		Normal	Slightly s	Irrigation limit	Sal, sodic	Highly s	Very highly saline, sod
SALINITY–E.C.	AB C	a	< 4 < 8	< 4 < 12	< 8 < 12	< 8 > 12	< 12 < 16	> 12 > 16	e	< 8	< 12	< 15	< 18	< 21	> 21
S. A R.		n	< 6	6 - 9	9 - 12	12 - 15	15 - 18	> 18	m	< 6	6 - 9	9 - 12	12 - 15	15 - 18	> 18
H. C. in/hr	AB C	h	0.3 to 1.2	0.12 to 0.30 1.2 to 2.0	0.04 to 0.12 2.0 to 2.8	0.02 to 0.04 2.8 to 4.0	0.01 to 0.02 4.0 to 6.0	0.00 to 0.01 > 6	p	> 0.2	> 0.08	> 0.04	> 0.02	> 0.01	< 0.01

ALBERTA DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES DIVISION

WATER RESOURCES ALBERTA

SOIL MAP
OF THE
STURGEON BASIN STUDY AREA
83-H-11

Scale: 1 Mile = **Date:** JULY, 1971 **Sheet:** 7 of 7

Submitted by: Henry Regier
Date: July, 1971
Approved by: R.H. Schulz
Date: July 9/71

Designed by: H. REGIER
Drawn by: B. JOHNSON
Checked by:

File No. 200-Z-3-L-1

3961

SUMMARY OF IRRIGABLE AND NONIRRIGABLE ACREAGES

Map Area	Category 2 Soils	Category 3 Soils	Non-Irrigable Soils
83-H-4	52,150	53,670	60,860
83-I-4	35,290	65,850	45,440
83-I-5		5,110	3,590
83-H-12	1,850	6,480	24,630
83-H-11	2,670	6,680	23,380
83-I-3	890	7,490	2,660
83-H-13	9,270	76,440	93,950
	103,120	221,740	254,510

Category 2 soils	103,120 acres
Category 3 soils	221,740 acres
Nonirrigation soils	254,510*

* This total includes 20,100 acres of organic soils, wet areas, and waters. Therefore, the total number of nonirrigable acres of land is 234,410.

Note:

Figure 3 (Surficial Geology of the Sturgeon River Area) and Figure 5 (Soil Categories for Irrigation within the Sturgeon Basin Study Area) are available, upon request, at a scale of approximately 2 miles per inch.